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# THE METAL INDUSTRY

WITH WHICH ARE INCORPORATED

THE ALUMINUM WORLD: COPPER AND BRASS: THE BRASS FOUNDER AND FINISHER:

## ELECTRO-PLATERS REVIEW.

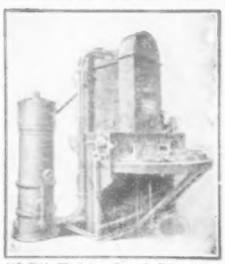
$1.00 Per Year 99 JOHN STREET, NEW YORK 10 Cents Per Copy

A MONTHLY JOURNAL RELATING TO THE METAL AND PLATING TRADES


## SAND-BLAST AND ALLIED EQUIPMENT

PANGBORN EQUIPMENT MAKES THE BEST INVESTMENT

"ASK THOSE WHO KNOW BY WORKING COMPARISON"



"LB" Table Sand-Blast

The largest plant in the world manufacturing Sand-Blast and Allied Equipment (Experience, Capital and Facilities Unequaled)

"AC" Hose Sand-Blast

"EA" Cabinet Sand-Blast

### IT PAYS TO SAND-BLAST

**For It Always Improves the Product and Usually Reduces the Cost**

**Bridgeport Deoxidized Bronze & Metal Co.** says: "The 'PANGBORN' Sand Blast has the tumbling barrel beaten to a stand-still."

**Capitol Brass Works** says: "The 'PANGBORN' Sand-Blast does the work of 4 or 5 hours and also does it better. Equipment has been in constant use for over 4 years; has had very hard service—being operated at times 18 hours per day—always cleans thoroughly and has given perfect satisfaction."

**Murphy-Potter Co.** says: "The 'PANGBORN' Sand-Blast saves money in the machining as it does not harden the surface of the castings as tumbling does."

**Interstate Foundry Co. says:** "The 'PANGBORN' Sand-Blast makes the ideal surface for plating and enameling."

**Syracuse Aluminum & Bronze Co.** says: "The following brief remarks cover our experience with 'PANGBORN' Sand-Blast and Allied Equipment: 1st—Castings better cleaned. 2nd—Cleaned in less time. 3rd—Customers better pleased. 4th—Profit sheet benefited proportionately. It should be only a matter of time until you have all the foundries equipped with your System."

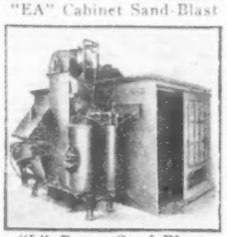
**Doehler Die Casting Co.** says: "Your Sand-Blast installation is giving us entire satisfaction in every respect."

**Dayton Engineering Laboratories Co.** says: "The 'PANGBORN' Sand Blast is cleaning our stampings and castings very satisfactorily and has done away with the plating troubles we were having."

**Maxwell Motor Co.** says: "The 'PANGBORN' Sand-Blast has cut our cost of cleaning castings in two."

**Hubley Manufacturing Co.** says: "We have completed the comparative test of the 'PANGBORN' and . . . . make of sand-blast and find that the 'PANGBORN' Equipment produces cleaner work, uses less sand and does the work in less time."

"GB" Barrel Sand-Blast



"L" Room Sand-Blast

"CC" Dust Arrester

"GC" Barrel Sand-Blast

"BG" Sand Separator

**Equipment of every type for every requirement**

**DUSTLESS — AUTOMATIC — SELF-CONTAINED**

**Literature for the asking. Representative thoroughly conversant will call and acquaint you fully without obligation**

**Sand-Blast and Allied Equipment exclusively**

PANGBORN CORPORATION
HAGERSTOWN, MD.
SAND-BLAST SPECIALISTS
P. O. BOX 854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**Metal Testing Instruments**

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for determining the drawing and stamping qualities of metal sheets.

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THE METAL INDUSTRY
WITH WHICH ARE INCORPORATED
THE ALUMINUM WORLD: COPPER AND BRASS: THE BRASS FOUNDER AND FINISHER:
ELECTRO-PLATERS REVIEW.

Vol. 15. NEW YORK, OCTOBER, 1917. No. 10.

# THE FOUNDRYMEN'S CONVENTION

A Report of the Conventions of the American Foundrymen's Association, the American Institute of Metals and the Exhibition of Foundry Supplies and Apparatus Held at Boston, Mass., September 24 to 28, 1917.

Written for The Metal Industry by L. J. Krom.

Once again a successful convention of foundrymen and exhibition of things appertaining to the metal industries has passed into history. This year as has been told in previous issues of The Metal Industry this most important event of the year in foundry circles was held in Boston, Mass., the most historical city in the United States. The city where our Pilgrim fathers lived, fought and died for their adopted country. The city where history tells us the first foundries were established in this country. It was eminently fitting, therefore, that this convention and exhibition should be held this year in this New England city. Equally fitting was it that the Mayor of Boston, the Hon. J. J. Curley, should choose a patriotic subject for his speech of welcome at the opening session of the convention and more fitting was it that this same session on Monday afternoon, September 24, should be held in Paul Revere Hall, erected and named in honor of that Revolutionary hero who roused the countryside to the dangers besetting it by means of his memorable ride so well told all over the world in prose and song.

It is for the above reasons and also for the clear and able manner in which Mayor Curley set forth his ideas in regard to a world peace and his classification of several kinds of heroes that we decided to publish his speech in full. The sentiments expressed in it are well worthy of careful reading and reflection.

## MAYOR CURLEY'S SPEECH.

Mayor Curley: Mr. Chairman, ladies and gentlemen: It is a very great privilege to address a convention twice within half an hour, but it is an exceeding pleasure to address the delegates to a convention in Paul Revere Hall as against attempting to address them in Mechanics' Building. The city during the past six months has entertained delegates, war missions and envoys representing substantially all of the leading powers of the world today. It has been our very great pleasure to entertain in our city the distinguished delegation headed by that great warrior that has emerged from the present struggle on the other side of the Atlantic, crowned hero, the man through whose terrorism and genius the power of Prussian militarism was stayed at the Marne, the distinguished soldier, Marshal Joffre of France. (Applause.) It has been our equally great pleasure to entertain the representatives of that courageous and valorous people who believed that honor was more sacred and a higher prize than peace and happiness and prosperity, the representatives of the Belgium nation, headed by Baron Monchuer. (Applause.) It has been our equally great pleasure to entertain, during the past six months, the head of the new Russian Republic in America, Ambassador Bachmurti, and to entertain during the past week the representative of the Japanese government, Ambassador Sarto; but all these various delegations, so important to the preservation and restoration of democracy and equality throughout the world, represent that force in the life of the world that has been deified from the beginning of time, the forces that stand for the tearing down policy, the forces that do not represent constructive progress, the forces that represent the destructive element in the march of humanity. We all sincerely pray that the termination of this war will result in universal peace and that it will be enduring in its character, but we must, if we desire permanent peace, change the trend of thought of the people of the world. There is not a city of any size in America, there is not a city of any size in Europe, that does not boast its soldiers monument, and there are not a hundred cities in all America that boast a monument to a constructive, contributing genius to human happiness and human progress. I personally have always believed that the man who developed the germs that would destroy sickness of a contagious character among children was one of the real benefactors of humanity, and I believe that the time will come, when the war has ended, when peace has been restored and when constructive progress through peace is the thought and the ideal of the world, the time will come when Louis Pasteur of France will rank higher than Napoleon Bonaparte ever ranked in the history of the world's great men. (Applause.) I believe the time will come, I believe the time will come in our own land, when that man who exemplified Dean Swift's aphorism and truth that the man who made two blades of grass grow where but one grew before was a real benefactor of humanity, and when we embark along the constructive peace program, then every agricultural center in America should erect a monument to the McCormicks, the heads of the McCormick Harvester Company of the West, who have made a million blades of wheat and barley grow where only stones and stubbles were before. (Applause.) The most pleasing note in the war-torn atmosphere of the world today is the fact that organizations such as yours still recognize their obligations to society and do not lose sight of the fact that when the war is all over and peace has been restored, the only way in which America can retain such progress and such advancement as the necessity of our times has forced upon her, is through the work that is performed by men engaged in your calling and men engaged in other industrial lines of activity. I believe the greatest injury that can be done America would be for the great industries of this land to either postpone convening or fail to hold these annual conventions. The convention affords an opportunity for the individual to emerge from the seclusion of his own thoughts, to interchange his thoughts with the thoughts of other men, to have an opportunity to see the perfected realization of other men's thoughts as represented by some machine designed for the purpose of reducing the amount of man power necessary to perform a certain task and for the development of an economy that will be forced on the world through the rebuilding program that will result from the destruction and ravages of the war and necessary because of the reduction in man power for the rebuilding of the great cities and towns of Europe, and it is to America that the whole world will look at the termination of the war, it is to

your industry that America must look, and if there is a necessity for universal military training for the preservation of our national life and for the continued existence of America as a leading power of the world, then there is an equally necessary and imperative duty on the part of manufacturers and men engaged in every line of industry to keep their industry at the highest possible degree of efficiency in order that they may be enabled, at the termination of the war, to cope with the great tasks that are confronting them as a result of the war; and I know of no industry that is better prepared, either through present prosperity or through the demands made upon it, than the industry represented by you men. We have been forced to emerge from our seclusion in the matter of the development of the use of by-products of coke and of coal; we have been compelled to emerge from our seclusion in the matter of fabricated steel and iron and its uses, and the lead which America enjoys in the matter of the steel and iron industry must be maintained for the good of America and for the happiness of the people of the world; and it is with a heart overflowing with a knowledge of the service you can render to America and to the world that I extend to you the hospitality of our fair city. You visit the city when the city is at its best; you visit it at a time when the heat is not oppressive and when the coldness of the atmosphere is less than that which you presumed would be the attitude of the inhabitants of the city. You visit it at a time when the changing foliage in any one of a dozen different routes that you may take of 60 miles leading out from the city is enchanting and bewildering with its profusion of color; you visit it at a time when our park system, the best in America, is at its very best; you visit it at a time when our institutions of a technical character and our educational institutions are opening their doors for the young men of this country; you visit it at a time when our Institute of Technology on the other side of the Charles River is at its best; you visit it at a time when you give strength and courage to the people interested in the success and the progress and the prosperity of America; you point out to the people of this city and this Commonwealth and this nation a duty and that duty is to regard, as the fathers regarded, the future of America, to regard it with a spirit of optimism, to regard it in the spirit that, come what will, and come what may, America will and must go forward in the march of progress for the welfare of humanity the whole world over. (Applause.)

## THE EXHIBITORS AND WHAT THEY EXHIBITED

THE EXHIBITION AND EXHIBITORS.

Fifteen years have elapsed since Boston had a Foundrymen's convention and exhibition and every visitor to the city during the week of September 24 to 28 cannot but admit that she rose nobly to the task of entertaining him on the one hand and furnishing the societies with most comfortable quarters for their scientific deliberations and a most wonderful hall for the exhibition on the other.

In point of numbers and also in the quality of the exhibits the Boston show far exceeded its predecessors held, with the exception of Atlantic City, N. J., in 1915, in western cities. One hundred and sixty-five firms occupied over 50,000 square feet of space in the magnificent stretches of Machinery Hall. While the attendance at all times was not as large as could be desired, due largely to slightly excessive entertainment features, the business done according to statements made by exhibitors was very gratifying and in a number of cases surpassed expectations.

ABELL-HOWE CO., Space 128
565 Washington Boulevard, Chicago.
Howe Trucks in various styles. Operating displays of American High Speed Chain for power drives, Union Pressed Steel Chain for general engineering use, and American Electric Hoists with foundry control.

THE AJAX METAL CO., Spaces 70 and 72
46 Richmond St., Philadelphia, Pa.
Variety of Ingots made by the Ajax process, and castings made from same, together with other interesting features. Variety of babbitt metals and die castings.

ALBANY SAND & SUPPLY CO., Space 132
Albany, N. Y.
Molding Sand.

AMERICAN FOUNDRY EQUIPMENT CO., Spaces 115 to 124
Cleveland, Ohio.
For description of Exhibit, see Sand Mixing Machine Co.

AMERICAN GUM PRODUCTS CO., Spaces 13 and 14
200 Fifth Ave., New York City.
Goulac Core Binder. Cores and Castings made from Goulac Core Binder.

AMERICAN LIGHTING CO., Space 78
Chicago.
Industrial and railroad floodlights, using 750 or 1,000 watt standard lights with a glass reflector, highly silvered and polished.

AMERICAN MOLDING MACHINE CO., Space 330
Terre Haute, Ind.
New 10-inch Jolt Rock Over Machine, and also new Jolt Stripping Plate Machine, with 12-inch draw.

AMERICAN MUSEUM OF SAFETY, Spaces 14, 16, 18
New York City.
Exhibit of Safety Appliances.

AMERICAN PIPE BENDING MACHINE CO., Space 178
Boston, Mass.
Pipe bending machine in operation.

ARCADE MANUFACTURING CO., Spaces 350, 351, 357, 358
Freeport, Ill.
Hand Squeezer, Air Squeezer, 24-inch Power Rollover Jolt Pattern Drawing Machine, No. 2 Modern Molding Machine, 24-inch Modern Jolt showing a ferrule plate, 38-inch Modern Jolt, Piston Drag Machine, Piston Cope Machine, Combined Jolter and Squeezer, Norcross Jarring Machine, and 3-inch Midget Core Jolter.

ARMSTRONG CORK & INSULATION CO., Space 276
Pittsburgh, Pa.
Insulating Brick, Cork Covering for water brine and ammonia lines, high pressure covering for steam pipes, corkboard for cold storage and refrigeration. Display to include raw materials, finished products and miniature models, together with interesting tests.

ASBURY GRAPHITE MILLS, Space 7
Asbury, Warren Co., N. J.
Samples of Ceylon and American Graphite for Foundry Facing, lubricating, Stove polish, Paint, and Electrical purposes.

ATHOL MACHINE CO., Space 12
Athol, Mass.
Vises of many types, and an assorted display of mechanics' tools. Photographs illustrating welfare work of the company.

E. C. ATKINS & CO., Spaces 263 and 264
Indianapolis, Ind.
Saws of all kinds, including metal-cutting circular saws, hack saw blades, frames, hand saws, metal cutting machines and foundry plates.

AYER & LORD TIE CO., INC., Space 171
Chicago.
A & L Interior Creosoted Wood Block Floor installed in booth, with photographs showing installations in all types of plants throughout the country.

B. & B. MANUFACTURING CO., Space 365
Indianapolis, Ind.
Stationary Power Molding Machine, Portable Power Molding Machine, Stationary Hand Jar and Squeeze Machine, Portable Hand Jar and Squeeze Machine, and Post Power Molding Machine.

BEAUDRY & CO., INC., Space 287
Boston, Mass.
One hundred pound Power Hammer arranged for motor drive, and a similar power hammer of 50 pounds capacity.

BERKSHIRE MANUFACTURING CO., Space 143
Whitney Power Building, Cleveland, O.
Air and Hand Squeezer Molding Machines, Flasks, Vibrators, Patterns, etc.

CHARLES H. BESLY & CO., Spaces, 234, 235, 244, 245
118 North Clinton St., Chicago.
Besly Vertical Spindle Disc Grinders, Besly Patternmakers' Disc Grinders, Wide Faced Ring Wheel Grinders, and Double Spindle Disc Grinders.

THE BILTON MACHINE CO., Space 247
Bridgeport, Conn.
Universal Gear Hobbing Machine, and Automatic Gear Milling Machine.

S. BIRKENSTEIN & SONS, Space 134
377 West Ontario St., Chicago.
Brass and Bronze Ingot, Aluminum Ingot (Virgin and Alloys). Babbitt, Solder, Phosphor Copper, Phosphor Tin, and all non-ferrous base metals. Castings made from these products.

THE G. S. BLODGETT CO., INC., Space 179
Burlington, Vt.
Two types of Portable Bake Ovens, used extensively in foundries for baking cores. These ovens are also sold for enameling and japanning purposes.

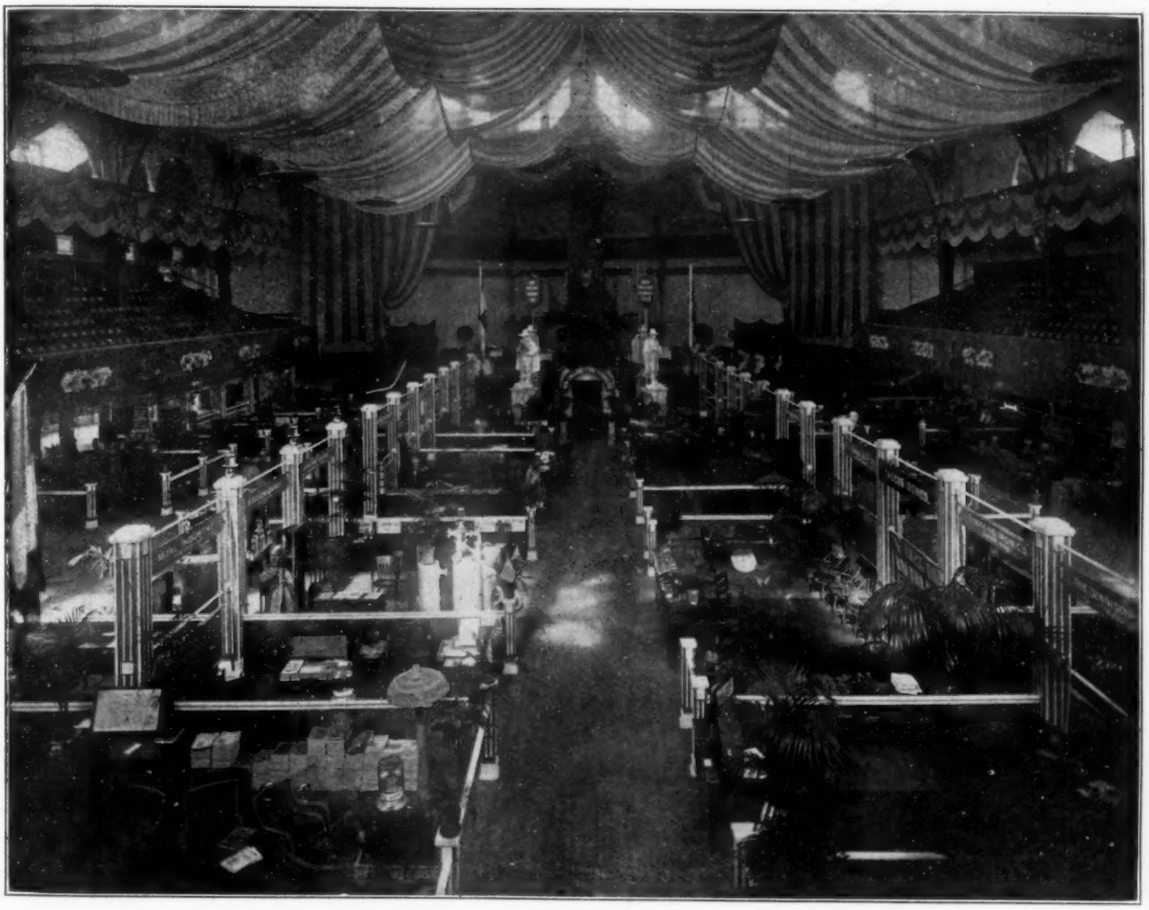
BLYSTONE MANUFACTURING CO., Space 137
Cambridge Springs, Pa.
Blystone Core Sand Mixer, equipped with rotary screen and electric motor.

BRIDGEPORT SAFETY EMERY WHEEL CO., Space 273
Bridgeport, Conn.
Belt and motor driven Grinding and Polishing Machinery. Also a number of grinding wheels.

BROWN SPECIALTY MACHINERY CO., Spaces 323 and 324
Chicago.
Core Machines, Electric Duplex Shaker, Revolving Barrel Sandblast Machine, equipped with cloth screen type dust arrester and exhaust fan, which will be in operation.

THE BUCKEYE PRODUCTS CO., Space 144
921 West Fifth St., Cincinnati, O.
Furnaces, metal melting, non-crucible and crucible; gas and oil fuel. Air and electric vibrators, parting compounds, core compounds, metal fluxes, core oven, patented flax pins, also patented flax guides with removable pins, etc.

CARBORUNDUM CO., Space 42
Niagara Falls, N. Y.
Carborundum and Aloxite Wheels, special Carborundum wheels for malleable grinding, and samples of crude material from which these wheels are made.



A VIEW IN THE GRAND HALL OF THE BOSTON, MASS., EXHIBIT OF FOUNDRY SUPPLIES AND APPARATUS, SEPTEMBER 24 TO 28.

CATARACT REFINING & MANUFACTURING CO., Space 24
Buffalo, N. Y.
Core Oils, Parting, Cutting Oils and Compounds, Tempering and Quenching Oils.

CHAMPION FOUNDRY & MACHINE CO., Space 126
2425 West Fourteenth St., Chicago.
Champion Electric Sand Riddles in operation.

FRANK D. CHASE, Space 173
Chicago and New York.
Foundry design and construction data, including photographs, paintings and plans of buildings and equipment, including furnaces, ovens and stacks; printed literature illustrating foundries designed and outlining the foundry engineering service.

CHASE TURBINE MANUFACTURING CO., Space 274
Orange, Mass.
Semi-automatic Polishing and Buffing Machine.

CHICAGO PNEUMATIC TOOL CO., Spaces 304, 342, 343
Fisher Building, Chicago.
Pneumatic Riveting and Chipping Hammers, Pneumatic Drills, Rammers and Hoists, Electric Drills and Grinders, Electric Sand Sifter, and Chicago Universal Hose Couplings.

CHISHOLM-MOORE MANUFACTURING CO., Space 199
Cleveland, O.
Chain Hoists and Eye Beam Trolleys.

CINCINNATI PULLEY MACHINERY CO., Spaces 283 and 285
Cincinnati, O.
Nine motor driven ball bearing drilling machines of different types and speeds, adapted to varying conditions of machine shop work.

CHARLES J. CLARK, Space 127
1716 West Adams St., Chicago.
Blast volume meters, and allied instruments for foundry use. Will introduce at this exhibit a new instrument for use in connection with cupola and other furnaces.

CLEVELAND BLOW PIPE & MFG. CO., Space 346
6302 Kinsman Road, Cleveland, O.
Dust Collecting System for use on buffing, polishing, grinding and emery wheels, consisting of motor driven exhaust fan, dust collector, and special hoods. Sheet metal shower baths.

CLEVELAND OSBORN MANUFACTURING CO., Space 91
395 Broadway, New York.
Foundry supplies.

CLEVELAND PNEUMATIC TOOL CO., Spaces 337 and 338
Cleveland, O.
Complete line of air operated tools for foundry purposes, in operation, such as chipping hammers, riveting hammers, sand rammers for foundry use, air drills, portable casting grinders, air hose, hose couplings, etc.

THOMAS E. COALE LUMBER CO., Spaces 101 and 103
Philadelphia, Pa.
White pine and Sugar pine pattern lumber.

COMBINED SUPPLY AND EQUIPMENT CO., Space 40
Buffalo, N. Y.
Angle Stem Single Piece Double Head Chaplets, tinned.
Represented by S. LeViness, Jr., President and Treasurer, and C. L. Jackson, Vice-President.

CORN PRODUCTS REFINING CO., Space 162
17 Battery Place, New York.
A working exhibit showing the making of cores, also the drying, using Kordex.

CURTIS PNEUMATIC MACHINERY CO., Spaces 306 and 315
St. Louis, Mo.
Vertical double-cylinder single acting compressor, water cooled with a regulating sight feed splash oiling attachment. This compressor is motor driven with automatic pressure control, and is provided with a circulating pump for cooling water. Pendant vertical cylinder air hoists, and horizontal rope compounded cylinder air hoist, suspended from single I-beam trolleys. Single I-beam hand-operated bridge crane with trolley, and single I-beam bracket bridge crane.

CUTTER & WOOD SUPPLY CO., Spaces 201, 203, 205
Boston, Mass.
Foundry Equipment, Tools and Supplies, Machinists' and Patternmakers' Supplies.

DAVIS-BOURNONVILLE CO., Spaces 344 and 345
Jersey City, N. J.
Oxy-Acetylene and Oxy-Hydrogen Welding and Cutting Apparatus, Acetylene Pressure Generators, Portable Acetylene and Oxygen Tanks, Oxygraph and Radiagraph Cutting Machines, Accessories.

DEREVOISE-ANDERSON CO., INC., Spaces 41 and 43
56 Liberty St., New York City.
Interesting exhibit of Foundry Iron, Charcoal Iron, ores, coke, limestone, etc.

DINGS MAGNETIC SEPARATOR CO., Space 120
671 Smith St., Milwaukee, Wis.
Type M., No. 3 Separator, complete with motor generator set; Type O, No. 2 Separator, complete, with D. C. motor, 12 x 24 inches. Magnetic Pulley Type Separator, with D. C. motor, and hand magnet for finding iron in light brass.

DIVINE BROS. CO., Space 274
Utica, N. Y.
Polishing Wheels, Buffs, Glue Heaters, Polishing wheel balances, and a general line of polisher supplies.

JOSEPH DIXON CRUCIBLE CO., Space 32
Jersey City, N. J.
Crucibles, Covers, Stirrers, Stoppers, Sand Crucibles, Scorifiers, Cupels, etc.

STANLEY DOGGETT, INC., Space 19
New York City.
Parting Compounds, "Original Perfection Brands," "Facamold," substitute for Lead and Plumbago, Talc and Soapstone Facings.

G. DROUVE CO., Space 177
Bridgeport, Conn.
Anti-Pluvius Puttyless Skylights, and Window Operators.

EASTERN BRASS AND INGOT CORPORATION OF NEW YORK, Space 82
Waterbury, Conn.
Briquet-Ingots (made from brass chips).

FEDERAL FOUNDRY SUPPLY CO., Spaces 310, 311, 318, 319, 320
Cleveland, O.
Six sizes of Jolts, six sizes of Squeezers, and Combination Bolt and Squeezer Machines. Core ovens. Samples of plumbago, core washes, snap flasks, slip jackets, etc.

FELT & TARRANT MANUFACTURING CO., Spaces 28 and 30
Chicago.
Comptometer. Adding and Calculating Machines.

FORBES & MYERS, Space 230
172 Union St., Worcester, Mass.
Electric Grinders.

FOREIGN CRUCIBLES CORP., LTD., Space 3
New York City.
Samples of imported Graphite Crucibles.

THE FOUNDRY EQUIPMENT CO., Space 106
Cleveland, O.
Coleman Foundry Equipment; Coleman Rolling Drawer Core Oven, Portable Rack Type Oven; Coleman Hand Squeezer; Coleman Aluminum Melting Furnace, Oil Burner, Crucible Lifter, etc.

GARDNER MACHINE CO., Spaces 256, 257 and 258
Beloit, Wis.
Five types of belt and motor driven polishing lathes; ten types of sizes of Gardner Grinders, as well as an assortment of supplies. Show board with actual sample pieces of work done on Gardner Grinders. New machines in operation.

GENERAL BRIQUETTING CO., Space 85
25 Broad St., New York.

GENERAL ELECTRIC CO., Spaces 227, 228 and 229
Schenectady, N. Y.
Electric Core Baking Furnace, Blower Sets. Fans, Heaters, Lamps, and Supplies. Lantern Slides. Photographs of various installations.

GENERAL FIRE EXTINGUISHER CO., Spaces 190 to 197
Providence, R. I.
Sprinkler System complete with supervisory Service connections and Cabinet for demonstration of action of sprinkler in case of fire. Rector System of heating. Hale Mixers for industrial and domestic purposes.

GENERAL PLATERS' SUPPLY CO., INC., Space 37
56 Wall St., New York.
Genuine Imported Graphite Crucibles.

GOLDSCHMIDT THERMIT CO., Space 69
New York.
Complete line of samples of Carbon-free metals and alloys, including tungsten, chromium-manganese, ferro-chromium, ferro-tungsten, manganese-copper, cobalt, etc.

GREAT WESTERN MANUFACTURING CO., Spaces 140 and 142
Leavenworth, Kans.
Gyratory Foundry Riddles.

HARRISON SUPPLY CO., Space 56
Boston, Mass.
Metallic and blast abrasives, including chilled shot and crushed shot for sandblast purposes.

THE HART & HUTCHINSON CO., Space 36
New Britain, Conn.
Steel lockers for factory use. New solutions of the coat room problem.

HAUCK MANUFACTURING CO., Space 152
Brooklyn, N. Y.
Cupola lighters, mold dryers, ladle and rivet heaters, torches and forges.

HAYWARD CO., Space 84
New York City.
Photographs of equipment for handling various materials with different kinds of hoisting apparatus.

HOEVEL MANUFACTURING CORPORATION. Spaces 339, 340 and 341
50 Church St., New York City.
Revolving barrel sandblast machine with pressure tank, and rotary table sandblast machine with pressure tank.

HERMAN A. HOLZ, Space 31
1 Madison Ave., New York.
The Erichsen Machine for Testing Metal Sheets. The Brinnell Meter (Portable hardness tester).

INTERNATIONAL MOLDING MACHINE CO., Space 174
Chicago.
Molding Machines.

A VIEW IN THE EXHIBITION HALL OF THE BOSTON EXHIBIT.

HERMAN PNEUMATIC MACHINE CO., Space 160
Union Bank Building, Pittsburgh, Pa.
13-in. Cylinder Plain Jarring Machine, and Combination Jarr Squeeze Machine.

HILL, CLARKE & CO., INC., Spaces 254 and 255
156 Oliver St., Boston, Mass.
Lathes, Shapers, Milling Machines, Grinders, Drilling Machines, Bench Lathes, Screw Machines, Power and Arbor Presses, Pipe Machines, and Cutting Off Machines, manufactured by the following firms: Atlas Press Co., Kalamazoo, Mich.; Boye & Emmes Machine Tool Co., Cincinnati, O.; Carlton Machine Tool Co., Cincinnati, O.; Carter & Hakes Machine Co., Winsted, Conn.; Consolidated Press Co., Hastings, Mich.; Flather & Co., Nashua, N. H.; Warren F. Fraser Co., Westboro, Mass.; Greenfield Machine Co., Greenfield, Mass.; Hardinge Bros., Chicago; Henry & Wright Manufacturing Co., Hartford, Conn.; Jarecki Manufacturing Co., Erie, Pa.; Knowlton Machine Co., Westbrook, Me.; W. K. Millholland Machine Co., Indianapolis, Ind.; Smith & Mills Co., Cincinnati, O.; Superior Machine Tool Co., Kokomo, Ind.; Wilmarth & Morman Co., Grand Rapids, Mich.

THE IRON AGE, Spaces 45 and 62
239 West 39th St., New York City.

THE JENNISON-WRIGHT CO., Space 47
Toledo, O.
Kreolite Wood Blocks for factory floors. Enlarged photographs of Kreolite Wood Block Factory floors; samples of wood treated with Kreolite oil.

SPENCER KELLOGG & SONS, INC., Space 135
Buffalo, N. Y.
Liquid Core Compounds and Pure Linseed Oil.

T. P. KELLY & CO., INC., Space 86
New York.
Foundry Supplies.

JULIUS KING OPTICAL CO., Space 57
7 West Madison St., Chicago.
Safety Goggles, Helmets, Masks, etc.

THE LAMSON CO., Space 129
100 Boylston St., Boston, Mass.
Lamson Gravity Roller Conveyors, Lamson wire-line message and parcel carriers, Lamson pneumatic tubes for handling orders, etc., in factory and office.

ARTHUR E. LANE LUMBER CO., Space 182
Grand Central Terminal, New York City.
Sequoia Lumber for pattern work.

THE H. M. LANE CO.,
Detroit, Mich.
Industrial Engineers. Foundry and Metallurgical Specialists.

LEES-BRANDNER CO., Spaces 242 and 243
Cleveland, O.
For a description of this exihibit, see Lynd-Farquhar Co.

LEWIS-SHEPARD CO., Space 11
Boston, Mass.
Elevating trucks for handling goods on platforms.

LUDLUM ELECTRIC FURNACE CORPORATION, Space 93
Woolworth Building, New York City.
Model of Ludlum Furnace. Samples of tool steel, pig iron, washed metal, and iron and steel castings, etc., now being made by the Sweetzer Bainbridge Metal Alloy Corporation. Large photographs of furnaces in operation, together with analysis of products, descriptive pamphlets, etc.

DAVID LUPTON'S SONS CO., Space 172
Allegheny Ave. and Tulip St., Philadelphia, Pa.
Models of various types of Lupton Steel Sash and other products. Lupton steel partition and doors, Lupton Rolled steel skylight. Detailed drawings and photographs of installations.

LYND-FARQUHAR CO., Spaces 242 and 243
Boston, Mass.
26-in. Combined open side crank planer and shaper in operation. Lees-Bradner gear generating machine and a thread milling machine in operation.

MACLEAN PUBLISHING CO., Space 54
Toronto, Ont., Canada.
The Canadian Foundryman; Canadian Machinery.

THE MACLEOD CO., Space 176
Cincinnati, O.
Sand Blast Hose Machine, Oxy-Acetylene Welding Torch, Combination Buckeye Heater, Cupola Lighter, Ladle Dryer and Skin Dryer for molds.

J. S. MCCORMICK CO., Space 180
Pittsburgh, Pa.
General Foundry Supplies.

MCCROSKY REAMER CO., Space 231
Meadville, Pa.
Complete line of Adjustable Reamers; Wizard quick-change chucks and collets; drilling, tapping and stud setting devices; turret tool posts for lathes; Searchlight Universal lamp brackets, and other cost-cutting devices for the machine shop.

MCLAIN'S SYSTEM, INC., Space 113
Milwaukee, Wis.
Samples of Semi-steel castings of light section, such as automobile cylinders, pistons and other castings containing 20% to 50% steel, made by McLain graduates. Open hearth steel castings poured of metal from McLain Carter Open Hearth Furnace. Projectiles weighing up to 1,400 lbs. a special feature.

MAHR MANUFACTURING CO., Space 305
715 15th Ave., N. E., Minneapolis, Minn.
Fuel Oil Torches for Cupola Lighting, mold drying, etc., Ladle driers and heaters, Melting furnaces, Rivet Furnaces, and Forging furnaces.

MALLEABLE IRON FITTING CO., Space 366
Brantford, Conn.
Complete line of "All Steel" vibrators. Complete line of vibrator accessories, including hand valves; blow guns, starting valves of all kinds, hose clamps, etc. Equipment in operation.

THE METAL INDUSTRY, Space 48
99 John St., New York City.

MICHIGAN SMELTING AND REFINING CO., Space 52
Detroit, Mich.
Detroit Standard Ingot Brass, Sillman Apex Bronze, Tin and lead products, including solders, lead pipe, babbitt metals, etc.

MIDLAND MACHINE CO., Spaces 312 and 321
Detroit, Mich.
Small Jar-Ramming Roll-over Machine, hand-rammed roll-over machine, and a small jar-ramming roll-over machine for making cores, designed for light operation by women in the core room, if necessary. All machines in operation. Motion pictures machines in operation in various plants.

MOLTRUP STEEL PRODUCTS CO., Spaces 139, 141
Beaver Falls, Pa.
An extensive display of flattened steel pattern plates, core plates, finished machine keys, finished machine rack and cold drawn steel bars.

MONARCH ENGINEERING AND MANUFACTURING CO.,
American Building, Baltimore, Md. Spaces 112 and 114
Brass Furnaces, Tilting Coke Crucible Furnace, Tilting and Stationary Oil Crucible Furnaces, and Acme Core Ovens.

MOTT SAND BLAST MFG. CO., INC., Spaces 369 and 370
8 Front St., Brooklyn, N. Y.
A working exhibit consisting of Sand Blast Tumbling Barrel, hose type machine, cabinet, and accessories.

E. H. MUMFORD CO., Space 367
Elizabeth, N. J.
Molding Machines.

MUMFORD MOLDING MACHINE CO., Space 125
Chicago.
Power Squeezers.

NATIONAL ENGINEERING CO., Space 322
Tacoma Building, Chicago.
Simpson Intensive Foundry Mixer in actual operation mixing foundry sand. Simpson Continuous Core Reducer and National Screen Separator.

NATIONAL SAFETY COUNCIL, Space 17
Chicago.
Safety Exhibit.

NEW CHICAGO CRUCIBLE CO., Space 89
2525 Clybourn Ave., Chicago.
Crucibles.

NEW ENGLAND COAL AND COKE CO., Space 58
Boston, Mass.
Model of Bunker Hill Monument reproduced from by-product coke.

THE NEW HAVEN SAND BLAST CO., Spaces 116 and 118
New Haven, Conn.
Self-contained Sand-blast Rolling Barrel, Hose Type Sand-blast Machine. Diamond Grit, Chilled Shot, and other Sand-blast accessories.

WILLIAM H. NICHOLLS CO., INC., Space 303
Brooklyn, N. Y.
Jolt Ramming and Power Squeezers with automatic gravity drawing device, plain power molding machine, plain combination jolt-ramming and power molding machine with roll-over device.

NORMA CO. OF AMERICA, Space 35
New York.
Ball bearings, roller bearings, precision testing instruments, etc.

NORTON CO., Spaces 269 and 270
Worcester, Mass.
Bench and floor types Grinding Machines in operation. Grinding wheels used in Foundry work.

O. K. CRUCIBLE CO., Space 9
136 Liberty St., New York.
Japanese Crucibles.

S. OBERMAYER CO., Spaces 167, 169, 198, 200, 202, 204
18th and Rockwell Sts., Chicago.
Power and floor sprue cutters, brass furnaces, tumbling barrel, core ovens, bellows, ladles and shanks, rosin mills, snap flasks, etc. Hausfield Open Flame Brass Melting Furnace. Combs' riddle.

OLIVER MACHINERY CO., Space 275
Grand Rapids, Mich.
16-in. Tool room engine lathe in operation. Photographs of complete line of pattern shop machinery, and the Universal Wood Milling Machine.

THE OSBORN MANUFACTURING CO., Spaces 331, 332 and 333
5401 Hamilton Ave., Cleveland, O.
Hand and power operated machines. Direct Draw roll-over jolt machines, plan air squeezers, combination jolt squeezers, "Little Wonder" roll-over machines, drop plate and stripping plate machines, combination jolt stripper squeezer machines.

OXWELD ACETYLENE CO., Spaces 232 and 233
Newark, N. J.
Complete line of Oxweld Equipment, part of it in actual operation. Oxweld low pressure type avetylene generating unit; Oxweld portable pressure generator in operation.

PANGBORN CORPORATION, Spaces 168 and 170
Hagerstown, Md.
Enlarged photographs of various types of machines and out-of-the-ordinary Installations of Sand-Blast and Allied Equipment, together with specimen castings before and after sand-blasting.

J. W. PAXSON CO., Spaces 33 and 50
Philadelphia, Pa.
Foundry Equipment and Supplies, Sand Blast Machinery, Sands, Facings, Moving Pictures, Photograph and Blue Print Display Fixture.

PEERLESS MACHINE CO., Space 272
Racine, Wis.
Peerless High Speed Heavy Duty Metal Cutting Saws.

THE PHILADELPHIA BOURSE,
Philadelphia, Pa.

PICKANDS, BROWN & CO., Spaces 53 and 55
Chicago.
A patriotically trimmed display of Solvay Coke in the form of a wheel hub, with gilded spokes.

PITTSBURGH CRUSHED STEEL CO., Space 5
Pittsburgh, Pa.
Samples of all sizes of Angular Grit, the original angular metallic sand blast abrasive.

PORTAGE SILICA CO., Space 166
Youngstown, O.

HENRY E. PRIDMORE. Spaces 327, 328, 329, 334, 335, 336
1901 South Rockwell St., Chicago.
Electric jarring machine in combination with air power rock-over power draw machine, Electric jarring machine in combination with air stripping plate machine, plain hand rock-over drop machine, plain air power rock-over hand draw machine, hand stripping plate machine, and air power squeezer machine.

QUIGLEY FURNACE SPECIALTIES CO., Space 175
New York City.
Furnace specialties, including powdered coal controllers, Lalor automatic oil valves, electric furnaces, high temperature furnace cement, and pyrometer equipment.

RAILWAY MECHANICAL ENGINEER, Spaces 250, 251 and 252
New York City.
Copies of Railway Mechanical Engineer. Photographs in frames illustrating application of all types of machinery to railroad work, textbooks, etc.

RICHEY, BROWNE & DONALD, INC., Space 138
2101 Flushing Ave., Maspeth, N. Y.
Small working model of our Roller-Ramming and Molding Machines, and Sand Handling Appliance.

RIVETT LATHE AND GRINDER CO., Space 277
Boston, Mass.
Back-geared precision bench lathe mounted on a cabinet with individual motor drive and attachments. Two sizes of internal grinders complete with standard equipment. Improved threading tool.

ROBESON PROCESS CO., Space 68
18 East 41st St., New York City.
Photographs, specimens of cores bound with glutrin, and samples of glutrin.

ROGERS, BROWN & CO., Spaces 63 and 65
Cincinnati, O.
The largest collection of samples of pig iron ever brought together. Bee-hive and By-product oven, metallurgical coke, a wide assortment of ferrous alloys, grey iron, semi-steel, and malleable iron castings of unique, practical, and ornamental character.

SAFETY FIRST SHOE CO., Space 15
Providence, R. I.
Molders' Shoes.

SAND MIXING MACHINE CO., Spaces 115 to 124
52 Vanderbilt Ave., New York City.
Sand Mixing Machine, "Humane" Sand-Blast Room, Rotary Table Sand-Blast Room, and Sand-Blast Tumbling Barrel.

SHEPARD ELECTRIC CRANE AND HOIST CO., Space 206
Montour Falls, N. Y.
Electric Hoists. Section of monorail track and T-bar conductor with insulators and accessories. Enlarged photographs showing entire Shepard line.

SIMONDS MANUFACTURING CO., Space 249
Fitchburg, Mass.
Hack Saw Blades, Files, Metal Cutting Circular Saws and Metal Slitting Saws. Inserted Tooth Metal Cutting Saw in operation on a machine.

W. W. SLY MANUFACTURING CO., Spaces 145 to 153
Cleveland, O.
Sand Blast Room, Horizontal Sand Blast Barrel, New Style Pressure Tank, Baby Sand Blast Mill with Dust Arrester; Resin Mill and Two-section Drawer type Core oven.

R. P. SMITH & SONS CO., Space 76
224 South Franklin St., Chicago.
"Protect-toe" Safety Shoes for Molders and Foundrymen.

WERNER G. SMITH CO., Spaces 71 and 73
Cleveland, O.
Linoil and other grades of core oils; specimens of cores and castings. Plumbago, firebricks and fire claw.

STANDARD EQUIPMENT CO., Spaces 347 and 354
New Haven, Conn.
Cinder Mill in operation.

STERLING WHEELBARROW CO., Spaces 75 and 77
West Allis, Wis.
Sterling Rolled Steel Flasks, Special Foundry Barrows, General Foundry Barrows, Shop Boxes, Flask Pins, Wedges, Skim Gates.

W. F. STODDER,
Syracuse, N. Y.
Cyclone Suction Sand Blast Nozzle.

STRONG, KENNARD & NUTT CO., Space 6
Cleveland, O.
Goggles and Safety Appliances.

SULLIVAN MACHINERY CO., Spaces 301 and 302
122 South Michigan Ave., Chicago.
Sullivan Angle Compound Plate Valve Short Belt Driven Air Compresser, 445 cu. ft. capacity. Sullivan splash oiled single stage, belt driven air compressor. Sullivan end rolling finger plate valves for angle compound compressor. Photographs and literature describing Sullivan air compressors of all classes.

SWAN & FINCH CO., Space 146
165 Broadway, New York City.
Core Oil, Cutting Oil, and special products used in foundry and shop practice.

THOMAS IRON CO., Spaces 49 and 51
Hokendauqua, Pa.
"Thomas Vanadium" Pig Iron.

TITANIUM BRONZE CO., INC., Space 131
Niagara Falls, N. Y.
Bronze and Copper Sand Castings, including Titanium Aluminum Bronze Castings. Bronze Die Castings of Titanium Aluminum Bronze.

UNITED COMPOUND CO., Space 38
228 Elk St., Buffalo, N. Y.
Buffalo Brand Vent Wax for core venting purposes, and

Buffalo Brand Pattern Wax, a substitute for beeswax and bayberry wax.

UNITED METAL HOSE CO., INC., Space 150
89 Chambers St., New York City.

Metallic Hose for pneumatic tools, sand blasting, welding and cutting apparatus, steam, water and oil.

UNITED STATES GRAPHITE CO., Space 130
Saginaw, Mich.

Graphite foundry facings.

U. S. MOLDING MACHINE CO., Spaces 348, 349, 355 and 356
Cleveland, O.

Plain Air Squeezer, Jar and Squeezer, Jar Squeeze Pattern Draw Machine, Plain Jar Machines, Jar Pattern Draw Machine, and Roll Over Pattern Draw Machine.

UNITED STATES SILICA CO., Space 133
122 South Michigan Ave., Chicago.

Samples of Flint Shot. Views of plants where Flint Shot is produced, also where it is used. Booklets and other literature describing the product, and reprints of trade paper advertisements regarding factories where its advantages have been demonstrated.

WADSWORTH CORE MACHINE AND EQUIPMENT CO.,
Akron, O.

Complete Core Room Outfits.

J. D. WALLACE & CO., Space 136
1401 West Jackson Boulevard, Chicago.

Wallace Bench Planer in operation.

THE WARNER & SWASEY CO., Spaces 266, 267 and 268
Cleveland, O.

Universal Hollow Hexagon Turret Lathe on Bar Work, Universal Turret Screw Machine on Bar Work, and Plain Head Turret Screw Machine equipped to do Bar Work.

WENTWORTH INSTITUTE, Spaces 105 to 111
Boston, Mass. Spaces 307, 308, 316, 317

Demonstrations and work in applied science as given in Foundry courses.

Work in molding by students, from selected assortment of patterns, showing various methods.

Represented by Arthur L. Williston, Principal; E. A. Johnson, Head of Foundry Department; W. H. Timbie, Head of Applied Science; David Rial, Instructor in Foundry Chemistry, and P. E. Petersen, Instructor in Foundry Practice.

WESTINGHOUSE ELECTRIC AND MFG. CO., Spaces 2 and 4
East Pittsburgh, Pa.

Exhibit of Safety Appliances used in the Westinghouse works.

WHEELER & HOLCOMB CO., Space 74
Chicago.

"Safety First" wearing apparel, including gloves and mittens made from asbestos cloth and leather. Aprons, leggins, spats, and other apparel for protecting foundry and steel works operators.

WHITE & BRO., INC., Space 64
Richmond and Hedley Sts., Philadelphia, Pa.

Copper and Brass Ingots, and castings (rough and smooth made from these in Ingots). Babbitt Metals.

WHITEHEAD BROS. CO., Space 87
Providence, R. I.

Foundry sands, supplies and equipment.

WHITING FOUNDRY EQUIPMENT CO.,
Harvey, Ill. Spaces 159, 161, 163, 192, 194, 196

Foundry Equipment, including a ten-ton crane trolley, teapot spout ladle, and round plate barrel tumbler. Photographs and drawings of extensive line of Foundry machinery.

T. A. WILLSON & COMPANY, INC., Space 21
Reading, Pa.

Industrial Eye Protectors known as William Safety Goggles and Willson Safety Flange Goggles, featuring Super-Tough lenses and the Willson Patented Safety Flange.

T. B. WOOD'S SONS CO., Space 39
Chambersburg, Pa.

Peerless Patented Tapered Snap Flask and Automatic Adjustable Patented Jacket. Flasks fitted with pin equipment of different designs will be shown in various sizes, as well as Jackets in corresponding sizes.

E. J. WOODISON CO., Spaces 325 and 326
1621 St. Aubin Ave., Detroit, Mich.

Woodison Electric Jar, Stripping Plate, Roll Over Molding Machine. Woodison Air Squeezers. Doroner Pattern Grinders. Electric Vibrators. Woodseed Liquid Core Compound. Foundry Facings, Supplies, Fire Brick, Platers' and Polishers' Supplies.

## AMERICAN INSTITUTE OF METALS.

This society held a most successful convention, being occupied with five sessions, one a joint one with her sister society, the American Foundrymen's Association, and four that were devoted to deliberations pertinent to its chosen field, the metals. At these four sessions no fewer than thirty-two papers were read, either by authors or by title and discussed. The annual address by President Jesse L. Jones, which we publish here, shows that the Institute has been alive to its obligations to the Government and America during the past year. The report of the secretary-treasurer, W. M. Corse, which follows Mr. Jones' address, shows the Institute to be in an excellent financial condition despite the raising of the dues during 1916.

### ANNUAL ADDRESS OF JESSE L. JONES,

President American Institute of Metals.

Mr. Chairman, Ladies and Gentlemen:

My brief remarks can have no better introduction than the acknowledgement of the pleasure and privilege of the American Institute of Metals in having Boston as a host.

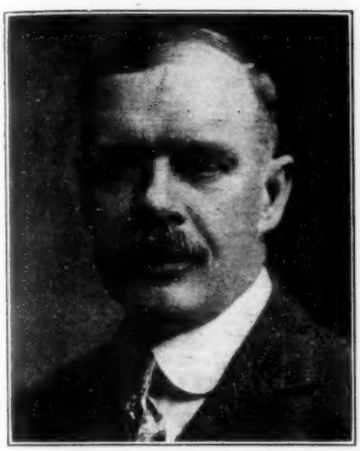
Although realizing that your city is active in manufacturing and commerce, we must first think of it as a home of learning, culture and patriotism. Hence, our meeting together here cannot be other than profitable, uplifting and inspiring.

Our excellent program will be an aid to us in directing our thoughts in the channels that lead to industrial accomplishment. I must congratulate the members of our papers committee on the energy and enterprise that they have displayed and the success that has crowned their efforts. The growth of the American Institute in the past few years can be attributed more to the character of the papers presented at the annual conventions than to any other single factor.

The period that has elapsed since the beginning of the war has been marked by great progress in non-ferrous technology. Possibly I may safely assert that greater advances have been made in that time than in the previous decade. Many of the things accomplished have been under the spur of necessity. Articles previously imported had to be made in our own country because they could no longer be obtained abroad. New problems that required solution also arose constantly in connection with the manufacture of munitions. There has been, however, outside of these unusual factors, a steady progress in attainment that while not epoch-making, is still very important and a tribute to the industry of those engaged in it. That these are stirring times in the non-ferrous world is shown by the record of things done recently.

Foremost I may mention the commercial production of electrolytic zinc. Previous to the war the market for high-grade zinc was rather narrow. With the placing of munitions contracts which called for brass with less than 1/10 of 1 per cent. lead, the demand was greatly augmented and the price mounted rapidly as the firms making high-grade zinc by distillation processes did not have the capacity to supply the unusual market. This resulted in a number of firms engaging in the manufacture of electrolytic zinc, it even being found profitable to cast anodes from prime western spelter and electrolytically refine them. In some cases a purity of 99.98 per cent. has been obtained. It will be interesting to users to see whether the electrolytic zinc is able to compete in purity, uniformity and price with the high-

## OLD AND NEW OFFICERS OF THE AMERICAN INSTITUTE OF METALS FOR 1917-1918.

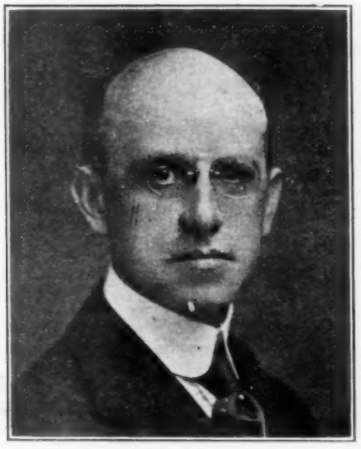


JESSE L. JONES, Retiring President.

W. M. CORSE, President.

F. L. WOLF, Secretary-Treasurer.

W. B. PRICE, Senior Vice-President.



W. A. COWAN, Vice-President.

H. J. ROAST, Vice-President.

C. W. JOHNSON, Vice-President.

F. L. ANTISELL, Vice-President.

G. M. FRITCH, Vice-President.

grade distilled zinc. If the two processes give equally good results there should be a broader market for high-grade zinc after the war when prices are lower and supplies abundant. The thin, tough coating that this grade of zinc gives, warrants its extensive use in hot galvanizing. It can also be used advantageously in high-grade manganese bronze, aluminum alloys, sheet brass, die cast alloys, etc.

Instead of the production of electrolytic zinc cathode sheets the product can be converted into zinc dust. As this zinc dust is very pure it opens the way for improvements in the sherardizing process, it being recognized that the purer the zinc coating on an iron or steel article, the better it will be protected from corrosion.

The production of electrolytic zinc has resulted in the accumulation of large amounts of slimes or residues high in cadmium. Electrolytic cadmium has been produced experimentally from these slimes, and I would suggest active research work in developing new uses on a large scale for metallic cadmium.

Quite recently the production of electrolytic tin has been announced. The difficulty of obtaining Straits tin makes the advent of the electrolytic tin doubly welcome. In the electrical industry, in particular, extremely pure tin is essential, as the connectors of electrical apparatus are its most vital parts and require the use of the highest grades of tin obtainable.

The demand for alloys for aeroplane work has brought magnesium into prominence. This metal, which came entirely from abroad, can now be had in any desired amount from American makers. The extreme lightness of its alloys with aluminum, the high speed at which they can be machined and their relative cheapness, bulk for bulk, should result in a constantly increasing demand for magnesium.

The scarcity and high price of antimony has led to the development of a novelty in the shape of electrolytic babbitt. This contains no antimony or tin necessarily, but consists of lead hardened by small amounts of the alkaline earth metals—barium, calcium, etc.

The crucible makers of the United States have been much handicapped by inability to obtain the Ceylon graphite and Klingenberg clay they formerly used. One prominent manufacturer when asked if any trouble was being had with his goods, replied epigrammatically, "Wherever you find a crucible maker in these days, you find a man very much chastened in spirit." With characteristic American energy and ingenuity, however, they have already so adapted the clays and graphite which are

THE ANNUAL BANQUET OF THE AMERICAN FOUNDRYMEN'S ASSOCIATION AND THE AMERICAN

available that very fair results are being obtained, except possibly on the larger sizes of crucibles.

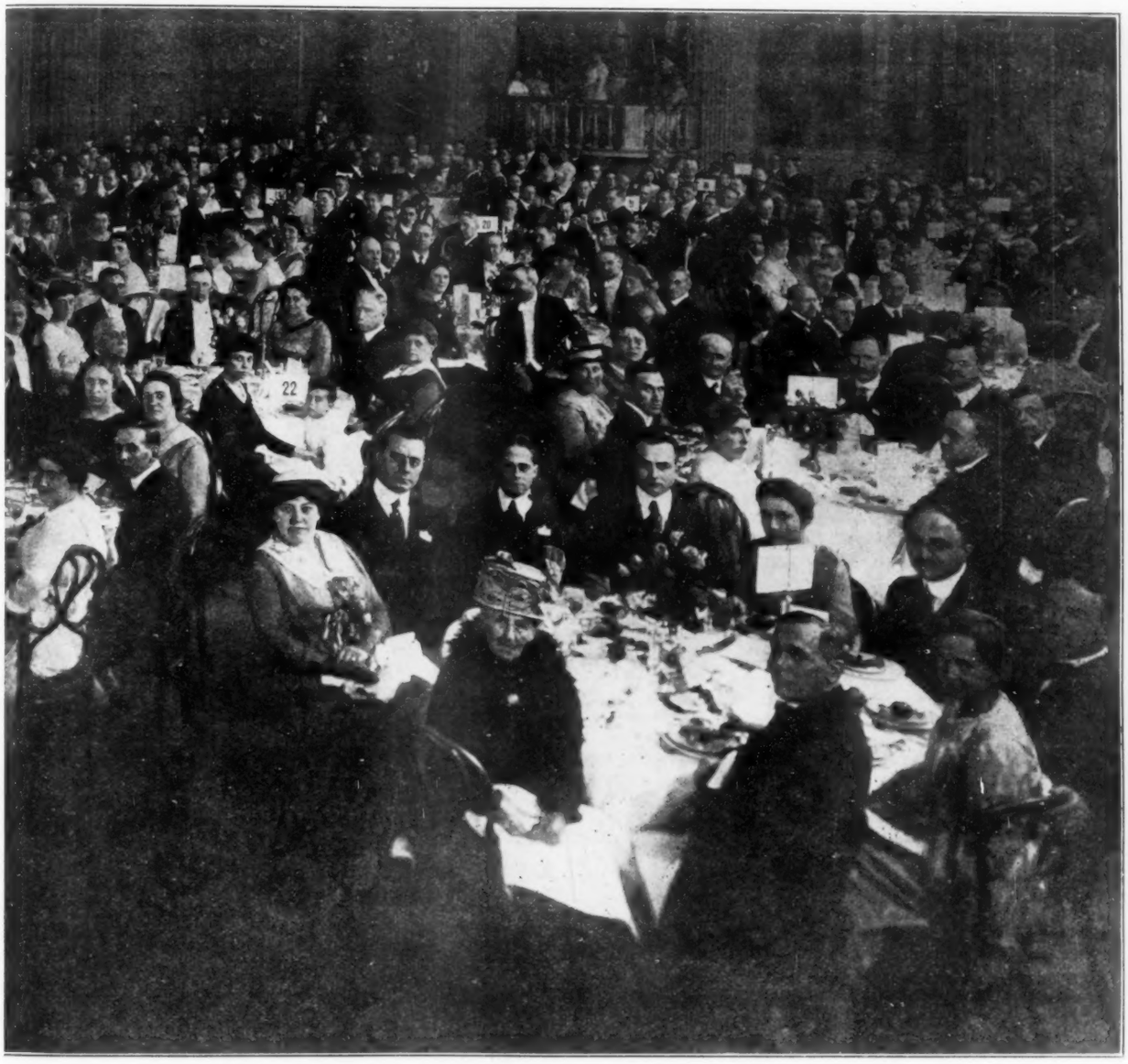
The high price of crucibles has led to the very rapid extension of electric furnace melting for non-ferrous metals. Both the carbon resistor and induction type of furnace seem to be doing satisfactory work in melting brass for rolling into sheets for cartridge cases, etc. For foundry work where light castings are run and hot metal required, not so much progress has been made. The use of the arc type furnace by a number of manufacturers for the making of tempering alloys or hardeners may also be noted. These alloys are used for the introduction of small amounts of high melting point metals into aluminum alloys and the various bronzes.

This list of non-ferrous achievements could be much extended, but I will mention only one thing more. Recently, when the demand for copper driving bands was so urgent that the tube mills could not meet it, a number of foundries succeeded in producing very satisfactory copper castings for this purpose. When rolled into bands, physical characteristics equal to those found in the drawn tubes were obtainable. In the opinion of many ordnance experts these bands, because they are rolled radially, are superior to those cut from tubes which are drawn lengthwise. The greatest care is required in order to obtain copper castings that will be sound and clean.

In keeping with the striking progress that the country has been making in non-ferrous technology, has been the progress of the American Institute of Metals. Our financial condition is excellent and all bills for the past fiscal year will be paid with funds collected during that same period. In other words, next year's income will not be drawn upon to pay previous obligations, as was done in former years to some extent.

We have up to July 1, 1917, 282 active members and 64 associates, which includes 28 corporation memberships, each having three members. We are to be congratulated on the caliber of the men seeking membership in our society. It gives me pleasure to note that the last two members received were those eminent metallurgists, Dr. H. M. Howe and Sir Robert Hadfield.

One of our vice-presidents is serving as a lieutenant of artillery and another has just returned from an extended European trip made for the purpose of collecting technical information for the Government's use in the manufacture of munitions. We had hoped to join our good friends of the American Foundrymen's Association in their plan to send a technical commission of three men from each society to France and England. This




INSTITUTE OF METALS HELD AT THE COPLEY-PLAZA HOTEL IN BOSTON, MASS., SEPTEMBER 27, 1917.

excellent proposition was, however, not acted upon favorably by officialdom.

Another step in advance has been our decision to issue a quarterly journal instead of the annual volume of proceedings. Dr. Paul E. Merica, of Washington, D. C., is the editor, and the first volume, which contains many of the papers to be presented at this convention, is now ready for distribution.

### SECRETARY-TREASURER'S REPORT.

The membership of the Institute on July 1, 1917, showed an active membership of 282 members and an associate membership of 64, making a total of 346. In the active membership are included the corporation members, the corporation members figuring as three active members each. This is an increase of 69 over last year. The number of corporation members has increased from 19 to 28. This is very gratifying because it enables us to increase our finances at the same time giving large corporations membership privileges at approximately 20 per cent. reduction in price.

The most important feature of the current year has been the adoption of the plan to issue a quarterly journal instead of the annual Volume of Transactions. Dr. Paul D. Merica, of the Bureau of Standards, has been appointed editor of this journal and through the Papers' Committee of which he is a member, will obtain the papers for the convention and edit them before going to the journal. It is earnestly hoped that this change in plan will keep the Institute in closer touch with its membership and be the means of keeping each member more fully advised of its happenings.

The Papers' Committee for this year, of which Mr. W. A. Cowan, of the National Lead Company, is chairman, has prepared us an unusually good programme. It seems to the secretary every year that it is very difficult to improve on the programme of that year but as each new committee takes hold of the proposition they seem to be able to improve it markedly.

The interest shown in the work of the Institute by correspondence to the secretary's office indicates it is filling a real need at the present time and its members have been called on by the Government to serve in various capacities of a technical nature.

A change in the Constitution has been approved by the Executive Committee as follows:

"Section 6. Privileges. All classes of members shall have the right to take part in all discussions and to vote on any subject brought before a meeting. Active and Honorary Members shall each receive one copy of each issue of the journal of the Institute. Each Corporation Member shall appoint one person, and may appoint three, to represent it. These representatives shall have all the privileges of Active Members, but no Corporation Member shall have more than one vote. Honorary Members and Associates shall not be eligible for office."

Financially the Institute was never in better shape. All bills incurred for the fiscal year ending July 1, 1917, were paid from the current funds of that year.

The balance on hand was just about sufficient to take care of the binding expense which did not come until after the opening of the new fiscal year. Apparently the policy of raising the dues has done just what the Executive Committee hoped at that time and has put the Institute on a sound financial basis without impairing its membership.

The books for the two years ending July 1, 1916, and July 1, 1917, have been audited and the report of the audit is herewith appended. The financial statement is also attached.

RECEIPTS.

| | | |
|---|---|---|
| Balance, July 1, 1916 | | $332.41 |
| Dues for 1916-1917 | $2,952.59 | |
| Cash received for volumes | 329.81 | |
| Proceeds from convention, etc. | 146.25 | |
| Cash for emblems | 36.00 | |
| Interest | 24.40 | |
| | | 3,489.05 |
| | | $3,821.46 |

DISBURSEMENTS.

| | | |
|---|---|---|
| Insurance premiums | $23.90 | |
| Expenses of Programme Committee, badges, etc. | 268.55 | |
| Stenographic report Cleveland meeting | 125.00 | |
| Salary for editing Volume X | 100.00 | |
| Stenographer's salary | 300.00 | |
| Secretary's salary | 600.00 | |
| Exchange | 7.60 | |
| Binding, labels, cartons, advance papers, etc., Volume IX and X | 1,981.74 | |
| Dues refunded | 2.50 | |
| Treasurer's bond | 5.00 | |
| General expense, stationery, etc. | 81.73 | |
| Postage | 85.40 | |
| | | $3,581.42 |
| | | 240.04 |
| | | $3,821.46 |

Respectfully submitted,
Secretary-Treasurer.

### NEW OFFICERS FOR 1917-1918

The nominating committee composed of L. W. Olson, chairman, N. K. B. Patch, W. H. Bassett, W. B. Price and H. W. Gillett presented a ticket which was unanimously elected. The new officers for the coming year are William M. Corse, president; F. L. Wolf, Ohio Brass Company, Mansfield, Ohio, secretary-treasurer; W. B. Price, Scovill Manufacturing Company, Waterbury, Conn., senior vice-president, and George K. Burgess, Bureau of Standards, Washington, D. C.; Harold J. Roast, James Robertson Company, Ltd., Montreal, Canada; J. P. Salter, Ohio Brass Company, Mansfield, Ohio; W. A. Cowan, National Lead Company, Brooklyn, N. Y.; H. S. Gulick, More-Jones Brass and Metal Company, St. Louis, Mo.; H. A. Wentworth, American Zinc & Lead Company, New York; F. L. Antisell, Raritan Copper Works, Perth Amboy, N. J.; G. M. Fritch, American Brass Company, Kenosha, Wis., and C. W. Johnson, Westinghouse Electric and Manufacturing Company, East Pittsburgh, Pa., vice-presidents.

### CARE OF ALUMINUM WARE.

Aluminum ware, the kitchen utensils that are so attractive to housekeepers and supposed to be so satisfactory, must be well cared for if one would keep them bright and of practical use.

To begin with—the salesman may tell you that aluminum ware will not scorch, but if you leave a dry pan over an intense gas flame you will find a hole in your best aluminum, in spite of your faith in his statements. You have no right to expect impossibilities. With ordinary care and good judgment this ware will prove all you could ask. There are just a few things to remember.

Heat penetrates aluminum ware twice as rapidly as it does tin, and three times as rapidly as it does iron. And not only does it heat more rapidly, but aluminum holds the heat longer. Consequently, the gas need be turned on full only at the beginning. It should then be turned lower.

Any discolorations on aluminum ware are sure to be on the surface only and can be removed by a good cleaning powder. Hot water and soap are enough to keep it in good condition usually, but any white metal polish will keep it bright and shining. Be careful to avoid coarse, gritty cleaning powders.

Remember, too, that ammonia, potash, lye, soda or strong cleaning powders will stain the inside of your kettles and the stain will be one you can never remove; so be careful.

If the kettle or pan needs scraping use a wooden spoon—not a knife. If so badly scorched that this does not answer fill it with hot water and cover, then boil for several minutes and scrape with the wooden spoon or a clothespin. A piece of fine sandpaper is also good.

# THE INSTALLATION AND OPERATION OF A SMALL RECLAMATION PLANT

A Paper Presented Before the American Institute of Metals, Boston, Mass., September 24-28, 1917.

By W. H. Parry, Superintendent National Meter Company, Brooklyn, N. Y.

When in the course of human events the prices charged for the non-ferrous metals get to the highest pinnacle of eminence, then it becomes necessary to reclaim any and all residues emanating from a brass foundry or any plant that handles brass in sufficient quantities to make such an installation pay.

The method pursued by the average maker of such residues is to sell same on the basis of their copper contents. Without entering into the merits and demerits of this method, though it is claimed that it is eminently fair to both buyer and seller, it is a well known fact that the dealers wax very prosperous, while the manufacturers who sell to this gentry are hard put to make both ends meet.

Bearing this fact in mind, it was decided by a manufacturing concern to install their own reclamation plant, and a recital of the troubles that beset the path of the man responsible for the installation will be the subject matter of this paper, and it is hoped that the facts herein stated will be of some value to those proposing similar installations.

After considering the various types of furnaces, even including the cupola, it was finally decided to have a coal-fired reverberatory furnace built with a capacity of 3,000 pounds per charge. The contract was let out to a furnace builder specializing in that type of furnace. His blue prints were examined by the plant engineers, and a few alterations made to conform to what the engineers thought such a furnace ought to be, in spite of the builder's mild protest that such changes would be very detrimental to its successful operation. The furnace, however, was built according to the engineer's plans, and everything went along lovely until its operation was attempted, then everything happened that could happen, with the possible exception of an earthquake.

The first weakness that developed after a fire had been started in the furnace and kept up with the object of drying out same, was the cracking of the cast iron buck-stays with which the furnace was very liberally braced. Their bracing qualities, however, were of such a nature that when subjected to transverse stress that they gave way with resounding detonations that gave the furnace tender the impression that all the cannonading is not confined to European battlefields. These gray iron buck-stays were replaced by those made of the garden variety of steel railroad tracks of the "I" type, and no further trouble was experienced from that source.

The fire box was equipped with 1¼ inch square steel grate bars, so spaced that an air space of 1¾ inches was allowed between bars. As soft coal was used, this allowed about seventy-five per cent. of the coal to drop down into the ash pit. These were replaced by cast iron bars so designed that an air space of ¾ inch was allowed and that problem was solved.

The next and most important of all errors of omission and commission perpetrated on this young and tortured furnace, was the reducing of the stack area, thus making it impossible to do anything more than fuse the metal. The return flue passing over the roof had a 240-inch area, while the stack was squeezed to 113 inches. This brilliant performance was extremely detrimental to the successful operation of the furnace, and proves that data bearing on steam boiler practice is utterly without value on melting furnaces. A new stack was erected with a 340-inch area, and the height increased 10 feet, making the total distance above the flue 40 feet.

The next problem to solve after all these alterations had been made was the proper flux and proportions of same to the charge in order that as little melting loss would result, and right here it is in order to state that there is more mis-information in the so-called text books that deal with this subject than there are pages between their covers. In fact, it would be nearer the truth to state that there is absolutely no information obtainable from such sources.

As an instance we will mention the famous Bulletin No. 73, on Brass Furnace Practice, issued by the United States Government, Department of the Interior, Bureau of Mines, which ought to be a mine of information due to the data having been collected under government supervision, but what do we find there? A hodge podge of opinions by Smith, Jones and Brown, etc., who think that thus and so ought to be the case if the wind and tide are right at Sandy Hook. Glittering generalities are of no value in text books, and unless specific information is contained therein it would be better if they were not printed.

In the Bulletin No. 73, under the heading "Reverberatory Furnaces," on page 199, we quote thus: "Several reverberatories are known to be in use usually somewhat intermittently for refining purpose," and again, "little information on the operation of these furnaces for refining is at hand."

The last paragraph is absolutely true, as the writer now knows, and the man who will write a book giving specific information as to dimensions, flue areas and coal or oil consumption, fluxes, stack heights, grate bars, fire box dimensions in relation to size of bath, and in fact any reliable data upon which any inexperienced man can make a fair stab at the game, ought to have at least a brass monument erected in his honor.

From sources more or less reliable (mostly less) several formulas were obtained as to the *correct* kinds of fluxes and their proportions to the charge. On trying them, failure after failure was the result. Technically trained experts with practical experience were consulted, and more formulas were prescribed, which failed dismally when tried. Advertisements in the daily papers and trade magazines failed to produce one man with sufficient experience to melt butter in a kitchen range, let alone a practical melter of foundry residues.

The builder of the furnace, strange to relate, knew next to nothing bearing on its operation, and could not find a man that would try his hand at the job of running it. In the meantime, the furnace was shut down to await the coming or birth of at least one human being capable of operating it.

To make things worse, all melters and those disguised as such, were employed at tremendous wages by the big smelting concerns, who were and are yet working their furnaces night and day trying to keep up with their war orders, so that the chances of hiring a melter or furnace tender were very remote indeed.

The hour of deliverance was at hand, however, when a man who was dissatisfied with the residence conditions "somewhere in Jersey" asked for and received the position. However, not without demanding wages out of all proportion to the size of the job. It turned out to be money well spent, as his operation of the furnace was a revelation to the owners in that he scorned to use any of the flux formulas whatever, and actually melted all the metal all of the time.

For the benefit of those who believe in fluxes, a list of those tried and found wanting will be of interest, but of course, bear in mind that the material to be melted was composed of spillings, turnings, slag, which had first been passed through a cinder crushing machine, band saw dust and grindings. The latter being of a consistency similar to No. 2 Albany molding sand, and one-third of it only being mixed with the charge.

FORMULAS.

No. 1—To every 1,000 pounds of metal, use 150 pounds of air-slacked lime and 150 pounds of pulverized charcoal. Mix all in a dry state, and the loss in melting will be very small. It was, we lost all we put in.

No. 2—To every 100 pounds of metal use a flux made as follows: Two parts of plaster paris, 1 part of air-slacked lime and 1 part of fluorspar. Mix in a dry state and use never more than 10 per cent. of the charge. "The loss will be negligble." *It was not,* it was 80 per cent.

No. 3—A mysterious composition, with a name that sounded like "Bunkoline," and whose constituents are known to the writer (and so are its virtues), though the price per pound was the tenth of a dollar, and that is about the proportion of the metal saved of the charge when we used it.

No. 4—Use 3 parts of lime, 1 part of silica sand, ½ part of anthracite coal to every 1,500 pounds of metal. As the flux weighed 900 pounds to a 3,000-pound charge, it was expected that the melting loss would be very small, but again we were fooled, as all that was saved was the silica sand, which was bought at five dollars a ton, and as we used but 100 pounds to the charge, we will leave it to the reader to figure out what we saved.

No. 5—Fluorspar, 1 part; lime, 3 parts, and hard coal, ½ part. The writer is ashamed to tell what happened to the charge when this flux was used.

We used no more of the so-called deoxidizers or fluxes when the furnace operator told us they were worse than useless, and proved by the results that he obtained that they were.

The writer does not take the stand that all fluxes are without value when attempting to reclaim brass foundry residues in a reverberatory furnace, but to any tyro who has the temerity to start such a plant the advice is given that the best way to begin is to ignore their use entirely and pay more attention to the flue, firebox, hearth and other essential areas that have considerable more bearing on successful melting than all the fluxes composed of varying proportions of fluorspar, charcoal, lime, hard and soft coal, silica sand, plaster paris, rock salt, cryolite, bunkoline and "solid ivorine," ever can be.

To successfully operate a reverberatory furnace for the purpose herein mentioned means a properly proportioned furnace, skilled operators and the keeping up of a continuous fire night and day without halt except for the making of a new fire when necessary. The worst thing that can happen to such an outfit is to lose the heat, as a cold furnace needs a lot of firing up for many hours before any metal can be melted.

Again, the quality of the coal enters into the scheme of things largely, as "slatey" coal will not make a hot fire, so that in buying soft coal none but the best should be considered. A ladle pre-heater is a good investment as part of the necessary equipment, as is also a goodly supply of ladles, clay lined or otherwise. Ingot molds of the reversible type are preferable to the single mold units, as they save time. A fair design for a reversible mold of the group or multiple type is rigged with a wheel on both ends, which are flattened on their periphery parallel to the mold levels, so that after one side is poured the other or empty side can be exposed by kicking it over and discharging the poured ingots on to the floor.

"Seger cones," for giving fairly accurate centigrade temperatures can be purchased cheaply at any chemical supply house, and will answer just as well as the most expensive pyrometers. When ordering these specify as 1000, 1100, 1200 and 1300 Centigrade. They are placed on the bridge wall and near the ladle pit or in niches near either of these spots, and will bend over when the temperature reaches the figures stamped thereon.

A cinder crushing machine and metal separator of the magnetic type are essential in any reclamation plant and the choice of either is best determined by the output desired. There are several makes of cinder crushers, including those that crush themselves more thoroughly than the material they are supposed to be able to treat. The writer's opinion is that the perfect cinder crusher has not been built as yet, though there are several that will give fair results.

Possibly the combination of a crusher, concentrating table and slime catcher is the machine of the future, if all the metal is to be reclaimed.

The pulley type of metal separator is a very efficient machine. The electro-magnetic charged pulley gives good results if the quantity of metal passing over is not too deep. The best work is done when a thin film not any deeper than the average depth of the particles themselves is passed over the prow of the drum.

A power riddle such as used for the riddling of molding and core sand is a time-saver in that the spirals, long chips, core wires and any foreign substances that the material may contain will be caught and removed before placing same in the hopper of the metal separator, where the presence of such obstructions are objectionable and always create trouble.

In going over this rather rambling account of one man's troubles I note omissions of importance, chief of which is that no mention is made of the end sought other than the statement that it was desired to reclaim the residues, without explaining in plain English that the ingots made were to be used in the making of red brass castings capable of standing up to a pressure of 250 pounds to the square inch. We found on analyzing the drillings from ingots taken from each pouring the usual spelter loss, and had to make it up in the remelt. We also used a water baffle tank, in which to place the grindings which disposed of the emery effectively before placing this material in the furnace.

DISCUSSION.

In the discussion that followed the reading of Mr. Parry's paper, which by the way was thoroughly enjoyed by the members, it was developed that some of the members thought Mr. Parry was a little hard on the flux mixtures that had been recommended to him. Mr. Roast thought that some of the fluxes had considerable merit when used under the proper conditions. Some questions by some of the members brought out the statement by Mr. Parry that the metal contents of the material he was treating ran about 95 per cent. In this event, of course, little flux is necessary. There is no question, however, as to the value of flux mixtures when used under proper conditions and with the proper understanding of their manipulation.

## SOLDERING BRITANNIA METAL.

Glycerine being practically unobtainable, the following is suggested as a flux for soldering Britannia metal: Olive oil, 500 grammes; tallow, 400 grammes. Melt and slowly stir in 250 grammes of powdered resin and bring the mixture just to a boil. Allow the mixture to cool, then stir in 125 grammes of a saturated solution of sal ammoniac. This flux should be used when cold.

# THE CRUCIBLE SITUATION

Paper Read at Boston Meeting of American Institute of Metals, September 24 to 28, 1917.

By M. McNaughton, The Joseph Dixon Crucible Company, Jersey City, N. J.

Like many other industries, the manufacture of plumbago crucible has been deeply affected by conditions arising out of the present war. The disturbances set up have of course extended to the users of crucibles, affecting them seriously in the way of increased costs and in some cases, reducing output because of a shortage of supply.

It has been suggested that it would be well if the crucible users were more fully informed as to those details of crucible manufacture which have been most disturbed by war conditions, referring of course to the conditions of supply and demand of the essential materials of crucible making.

The important and eseential ingredients of the plumbago crucible are the plumbago itself and the clay which serves to hold the crucible together in the process of manufacture and in use.

Before the war all of the clay for crucible purposes was imported and probably 95 per cent of the plumbago. The clay used almost exclusively came from the small town of Klingenberg in the Western part of Germany. The mines are the property of the town and the profits from the operation of the mines largely meet the municipal expenditures. The clay is of remarkable quality and uniformity, and the extent of the deposit has made it an adequate supply against the large demands made upon it. These facts made this clay by far the best yet known for the crucible maker's use. Clay was mined and shipped during the entire year, shipments reaching this side in from four to six weeks after leaving the mines. But, even with these favorable conditions, the maker usually carried a year's supply on hand, this to secure the advantage of natural drying, the clay carrying about 22 per cent free water, also to minimize and have time to detect and correct slight variations as must occur from time to time in its quality.

Shortly after the war opened Germany prohibited the shipment of this clay, perhaps forseeing the large demand of the Allies for ammunition and metals from this country. The rapidly increasing demand for crucibles shortly after the opening of the war showed that a supply of clay usually sufficient to last a year would carry them a much shorter time and that a substitute must be found. The crucible industry found itself in the same position as that of many others which for years had relied on what had appeared to be an absolutely dependable supply, both as to quantity and quality.

So it happened that very quickly the manufacturer was launched on the sea of experiment at a time of rapidly increasing demand, which increased finally to such a point where users waived all claim for quality, provided quantity was sufficient.

Appreciating the difficulties ahead, the crucible maker warned his customers what might be expected by informing them that the quality of crucibles made from domestic clays was an unknown quantity and that crucibles would be sold only on that understanding.

As anyone familiar with their manufacture know, the actual testing out of refractories is a very slow and long drawn out process. In the case of china ware, the testing would be largely in the way of overcoming the difficulties of manufacture. In the case of crucibles these difficulties are not serious, but the real test it has to stand is that of actual service.

The chemical and physical laboratory has been called upon, in the search for a suitable substitute for the German clay, but the results of such investigation have for the most part been negative, that is, by such investigation we are enabled only to eliminate from real tests such materials as do not measure up to such standards as have come to be recognized.

Many score of clays have been examined and perhaps a score have given indications of possible successful use. A clay giving favorable indications is mixed in varying proportions with the other ingredients of the crucible, among which may be other clays (for at the present time a blended clay seems to be the solution) and trial lots are made, say six, of each mixture. Owing to the long time required to make and burn crucibles and adding to the time required for transportation and actual use, two months is the least period required to get results from such tests and it is more likely to be three.

If the result of such a trial is favorable, another lot is made up, this time of fifty or one hundred, and sent out to different users. If the results obtained by the different users are in practical agreement the information is of real value. But when the reports are not in agreement, as is often the case, the test must of course be repeated.

In this connection it may be mentioned that one of the difficulties the crucible maker labors under is in getting informing reports as to the running of test lots of pots. This was particularly so during the period just passed. Many users did not appreciate the seriousness of the situation, and how important it was to the maker to get this information in a very accurate way. Later on as the rush of business increased, it of course became more and more difficult to keep accurate records, and undoubtedly the employment of many green workmen added to the uncertainty of the results obtained.

In order to gain results as quickly as possible, many experiments have to be carried on simultaneously. Under such circumstances, a long time must elapse before information becomes available, but as the information accumulates there is a steady progress toward the desired end. The results secured by the early attempts to use domestic clays were very unsatisfactory. In certain cases the average heats secured were four or five as against twenty-five to thirty previous to the war. At the present time results are much better, from fifteen up to twenty and twenty-five heats being the range of average service. The above figures refer to an average size crucible, say No. 80 and used in standard rolling mill practice.

The process of elimination has narrowed down the clays now in use to a comparatively small number, and concentration in the study and use of these must result in the steady, though perhaps slow, improvement in the quality of the crucibles made from them. It is not to be taken from this that the testing out of other clays is to be stopped. This work will go on until the best clay or clays for the purpose has been discovered.

As some users know, there have been lapses in the forward progress of the quality of the crucibles during this period of change. Such variations are in part explained by the fact that the clay miners in the earlier period were not prepared to meet the demands made upon them, and in later periods to the fact that railway transportation fell down for weeks at a time, during which time shipments could only be made by express and of course at enormous expense. Furthermore, these clay

mining operations mostly open workings, and subject to weather conditions and unproductive on this account for days and weeks at a time. The clay operators having prospered have so increased their equipment that a sufficient production is now reasonably assured, and with the government in a position to control shipments, transportation troubles should not recur.

For the information of those who have thought that the use of domestic clay should have a lowering effect on the cost of crucibles, it is sufficient to say that its cost is now more than double that of the German clay previous to the war.

The supply of plumbago for crucible making comes mostly from the Island of Ceylon, not more than 10 per cent. coming from Madagascar and America. The Ceylon plumbago differs from the other mentioned kinds by being more cubical in its crystalline structure, while the Madagascar and American graphite is in the form of thin flat flakes. The stock of Ceylon plumbago usually carried is a two to four months' supply, with a similar amount contracted for. Shipments come usually by direct steamer and require from five to eight weeks. The supply is usually regular, but may be interrupted by reason of extremely wet seasons, quarantine restrictions and perils of the sea. At the war's commencement, stocks in the makers' hands were probably larger than usual on account of bad business conditions prevailing in this country at that time.

In October, 1914, the British government placed an embargo on plumbago exports from Ceylon, which lasted more than four months. As a result of this interruption stocks here were entirely cleaned out.

In the meantime the demand for crucibles was growing and the insistent demand for shipments of plumbago on old orders, as well as the increase in quantity on new orders, started an upward movement in prices which never stopped until they were more than three times what they were before the war began.

After the embargo was raised shipments came forward with sufficient regularity to generally meet the requirements, although all of the makers would at times be out of material for short periods.

The conditions as to the supply of both of these materials, clay and plumbago, are much more satisfactory than they were a year and eighteen months ago. Supplies are calculated on a much larger output of crucibles, nearly all of the makers having increased their facilities. The annoying shortage which prevailed during 1916 will not occur again as a result of insufficient works capacity. Crucibles are of much better quality on an average than during that period so that the same number of crucibles will melt a much greater quantity of metal. The quality of the crucibles will be improved still further as more and more knowledge of the domestic clay is acquired.

The crucible maker expects to be able to meet any emergency that may come, and to do it in a way far more satisfactory to the crucible user than has been the case during the past two years.

DISCUSSION.

This paper as well as the one by Prof. A. V. Bleninger, of the United States Bureau of Standards, on THE MATERIALS USED FOR CRUCIBLES, read by George C. Stone, aroused a great deal of interest. The discussion brought out the fact that Mr. McNaughton took issue with Prof. Bleninger's statement that the question of the manufacture of satisfactory crucibles from American clays and graphite could be solved in the laboratory. Even admitting the enormous importance of such researches in indicating the proper procedure, still the final test must always come in the actual manufacture and use of the crucibles on an industrial scale. Owing to the great difficulty of making crucibles with clays and plumbago other than the time-tried imported materials, makers had been insisting that melters do as much work as possible in the smaller-sized containers. Even so, little decline in the demand and use for large sizes was noticeable from the rolling mills, consequently he thought the average size of crucible in use is about the same as before the war.

## LACQUERING BRASS CASTINGS.

To finish simply small brass or bronze castings by lacquering, it is customary first to tumble them, unless they have been machined sufficiently to remove the rough surfaces and are free from burrs. The dipping operation merely imparts a clean surface of high color and is done in a solution consisting of sulphuric acid, 1 gal.; nitric acid, 3 qts.; and a handful of common salt. When mixing these acids the nitric acid is put into a stoneware crock and the sulphuric acid pured into the nitric. The two are stirred well and then the salt is added. When replenishing the dip, 1½ parts sulphuric acid and 1 part nitric acid and very little, if any, salt is put into it. The castings are cleansed in a hot potash solution and removed therefrom and allowed to cool and dry without rinsing in water. The potash forms a film over the surface of the casting, which, when cool, is dipped momentarily into the acid solution and then rinsed in cold running water. This method obviates conveying an unnecessary amount of water into the dip. The solution sometimes fails to color when freshly made, and must be allowed to cool. After rinsing in cold water the castings are passed through clean, boiling water, and if of sufficient body to dry quickly, they are dried by swinging in the air, or if small or thin, they should be dried in clean hardwood sawdust, which must be entirely removed either by brushing or by using a riddle. The castings then should be lacquered with as little delay as possible. As it is essential that the castings should be perfectly clean and free from moisture, drying the castings is best done while still on the wires or wire basket holders, as that plan obviates handling. The thing to aim at is that the lacquering should follow the bright acid dipping as quickly as possible so that the article is coated and hung up to dry as quickly as conditions will permit.

The lacquer should be of such quality as will cover the article without affecting the lustre or obscuring the metal. A good grade of celluloid lacquer will be found to give the best results. It does not crack nor peel, and should be applied by dipping or spraying in a chamber free from dust and at a temperature of from 85 to 95 degs. Fahr. If a gold tint or other shade is desired, the coloring should be added in very small quantities. Porcelain or stoneware vessels are best for containing the lacquer while in use, although tin is used. If rainbow colors are noticeable after the first dip, a second dipping will usually remedy it. If the lacquer becomes thick, a thinner of the same grade as the lacquer should be used. Green-colored drops at the draining point indicate acid contamination, and the castings should be more thoroughly rinsed after bright dipping. If a drying chamber is used it should be heated by steam if work is being done regularly, as the chances of fire are lessened, the lacquering material being inflammable. If gas is used, extra caution is required and the chamber should be of sheet metal properly ventilated. The work should be dried slowly in the open air until all dripping ceases before being placed in a drying chamber. When the coating has set and dried, the temperature of the heater may be raised and the lacquer will thus become harder, tougher and practically non-porous.

# METAL CONSERVATION

THE ELECTROLYTIC RECOVERY OF COPPER AND SULPHURIC ACID FROM COPPER MILL PICKLING SOLUTIONS; BEING THE SUBJECT MATTER OF A PAPER GIVEN BEFORE THE PITTSBURGH, PA., MEETING OF THE AMERICAN ELECTRO-CHEMICAL SOCIETY, OCTOBER 5, 1917.

BY JESSE L. JONES, METALLURGIST, WESTINGHOUSE ELECTRIC AND MANUFACTURING COMPANY, PITTSBURGH, PA.

In the rolling of copper it is necessary to remove the copper scale that is formed in the various heating and annealing operations. If this is not done the scale is rolled into the copper giving a rough surface. Another reason for removing the scale is the fact that is it an abrasive and where copper is drawn into bars, strap or wire the dies would soon be ruined if the scale were not removed.

The pickling of copper is done in large, lead-lined wooden tanks using a solution of dilute sulphuric acid which is heated by waste steam. When the rate of pickling becomes slow, due to the solution becoming saturated with copper sulphate, more acid is added and the tanks

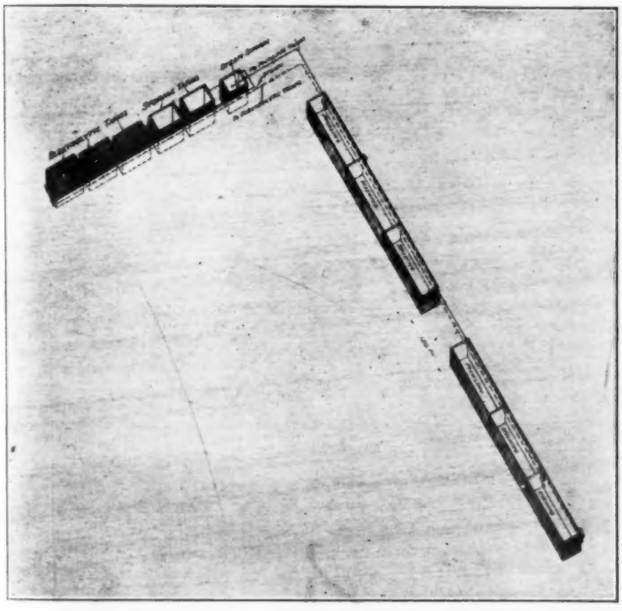


FIG. 1. PERSPECTIVE DIAGRAM OF COPPER RECOVERY SYSTEM.

are often run until supersaturated. It is not an uncommon thing in some plants to find the pickling tanks a solid mass of copper sulphate crystals on Monday morning when the steam has been turned off and the pickling solution allowed to cool.

Two methods have generally been followed by manufacturers for utilizing the waste pickle after it has ceased to be satisfactory for cleaning copper, viz.:

1—PRECIPITATION OF THE COPPER BY IRON:

The spent acid is removed from the pickling tanks to suitable precipitating tanks and a previously calculated amount of sheet steel or steel turnings is added. This addition serves to neutralize any free acid present and throws down metallic copper from the solution with the formation of sulphate of iron. The sulphate of iron solution is allowed to run off and the copper mud without any washing or other treatment is shoveled out, dried and sent to the copper smelter.

This method of procedure has a number of disadvantages. While the copper is recovered it is not in its most valuable form. The acid is not recovered, about 2 pounds of acid being lost for each pound of copper recovered. When soft steel or iron scrap is used for precipitating the copper, it is not uncommon to find pieces practically unacted upon at the end of six months, only the outside being coated with copper. By using cast iron borings and having an excess of acid, the reduction is rapid but the graphite, silicon, etc., from the cast iron, renders the copper mud less valuable. The drying of the copper mud, freight to the smelter and the smelting charges reduce the returns considerably.

2—MANUFACTURE OF BLUESTONE CRYSTALS:

Probably the most generally used method of utilizing the spent acid from the pickling of copper is to convert it into sulphate of copper or bluestone crystals. The spent pickle is neutralized as completely as possible by adding to it scrap copper or copper scale. It is next filtered and then concentrated by being allowed to evaporate spontaneously or by heating with a steam coil placed in the bottom of the tank. When the saturated solution cools, the copper sulphat crystals are allowed to form on lead or copper plates suspended in the solution and also upon the sides of the tanks. The large blue crystals are quite beautiful if seen when first withdrawn from the mother liquor of the crystallizing tanks. Recrystallization gives a purer grade of sulphate of copper.

A plan of carrying out the making of copper sulphate on a large scale has been patented by F. H. Daniels, A. F. Backlin and H. K. Swinscoe of the American Steel & Wire Co., of Worcester, Mass., in United States Patent No. 857793. Vacuum evaporators made of copper are used for the concentrating and a centrifuge for removing any liquor that adheres to the crystals.

This method has the advantage over the precipitation by iron method, that it utilizes both the copper and the sulphuric acid. It has, however, certain disadvantages. The sulphate of copper must not only be manufactured but also packed and sold. A considerable amount of it is used in making up various sprays to destroy insects. The vine growing districts of Austria, Italy and other European countries imported large amounts of bluestone before the war but this outlet has been shut off materially reducing the demand for it.

The strongest argument, however, against both of the above methods of handling waste pickling acid is that the pickling bath is constantly changing in acid content and for this reason cannot be relied upon to do rapid and uniform work.

3—ELECTROLYTIC RECOVERY:

In order to avoid the difficulties mentioned and more especially to speed up production and secure a pickling bath that would do rapid and uniform work, the Westinghouse Electric and Manufacturing Company has installed in its new copper mill an electrolytic plant that recovers both the metallic copper from the waste pickle and also the sulphuric acid. Figure No. 1 gives a perspective diagram of the entire recovery system showing both the pickling and electrolytic tanks.

The pickling is done in two lead-lined wooden tanks, each 16 feet long, 4 feet wide and 3 feet deep. They hold 1,300 gallons each. A few gallons per minute of the pickling acid is allowed to flow by gravity from the pickling tanks and is lifted by a steam siphon to the first one of the series of recovery tanks. (See Figure No. 2.)

The recovery tanks are five in number. They are each 6 feet long, 3½ feet wide and 4½ feet deep. They hold 535 gallons each and are lined with 7 lb. sheet lead. Another smaller tank 4 feet long, 3 feet wide and 4½ feet deep, holding 220 gallons, serves as a storage tank or sump. The sump receives from the last recovery tank an amount of regenerated acid equivalent to the amount of pickling acid received by the first recovery tank. The regenerated acid in this sump is returned by a steam siphon to the pickling tanks, thus completing the cycle.

Very good electrolytic results are obtained through continuous operation, keeping the acid content at about 14% and the copper at 3½%. We are, however, at present operating intermittently, regenerating the acid content high (about 20%) and running the copper down to about 1%. This plan is followed because of insufficient steam to satisfactorily operate the siphon, which is relied upon to circulate the electrolyte. Only three tanks have been used for the electrolysis so far, the other two being held in reserve. At present one of these (see Figure No. 3) is used for depositing a very heavy coating of copper on steel plates that are stamped up into discs for making arc lamp electrodes. These plates are first struck up in a cyanide bath and then the plating finished in this tank, using the waste pickling acid as the electrolyte and cathode plates from the recovery tanks for the anodes. This application was suggested by Mr. C. W. Johnson, general superintendent.

A trolley is placed over the recovery tanks and serves to lift out the anodes and cathodes which are placed in frames so that the entire set may be removed at one time. The anodes are of 7-pound sheet lead. They are 3 feet 10 inches long by 2 feet 4 inches wide and weigh 52 pounds each. The starting sheets are at present of thin sheet copper but will in the future be made by electrodeposition as is customary in electrolytic copper refineries.

The recovery tanks are arranged in cascade and set in a cement-lined pit provided with a sump to take care of any leakage. The series system is used with parallel circulation across the face of the electrodes.

Rubber connectors that are so made that they may easily be slipped off and replaced, connect the tanks with each other. They are cleaned out from time to time as there is some electrical leakage through them that plates out the copper in them and causes short circuits that burn out the rubber. Current is supplied by a 60 volt, 1,000 ampere generator which has capacity for a considerably increased production. Figure No. 4 gives the wiring diagram of the plant.

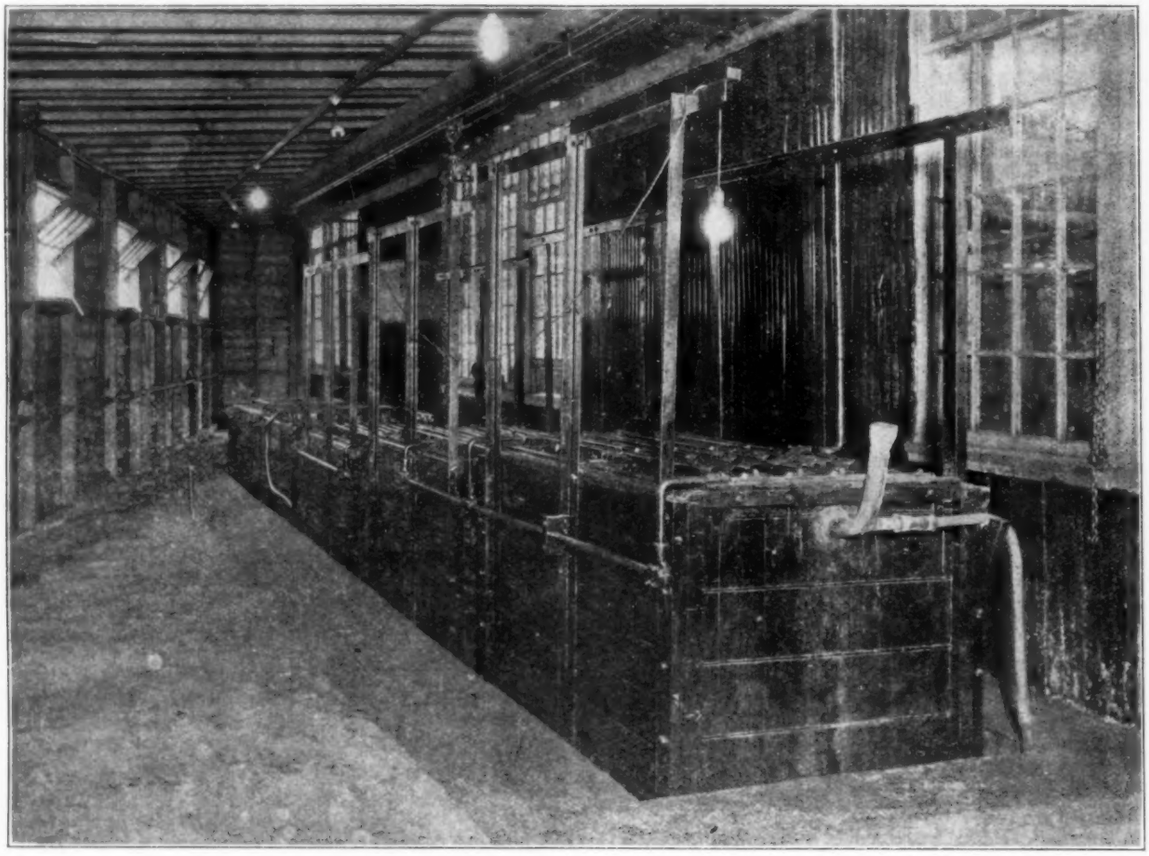


FIG. 2. A PLANT SHOWING TANKS AND EQUIPMENT FOR ELECTROLYTIC RECOVERY OF COPPER.

Our data on the preliminary operation of the plant is not very complete but sufficient to show fairly satisfactory results. The plant has been run 60 days, 10 hours each, using 65 kilowatts per day or a total of 3,900 kilowatts. There was recovered 3,355 pounds of copper and in addition 420 pounds of copper was plated upon 519 steel plates, making a total of 3,775 pounds of copper recovered. This is slightly less than one pound of copper per kilowatt hour.

The amount of acid recovered was about 5,500 pounds. The most marked advantage, however, was the increased rapidity of the pickling operation. The amount of copper pickled in the time mentioned was 2,714,594 pounds. Without the recovery plant it would have been necessary to considerably increase the capacity of the pickling tanks to do this amount of work.

Using three tanks in series and a current of 1,000 amperes at 2 volts, 135 pounds of copper and 200 pounds of acid are recovered daily. By adding additional tanks the output of the plant can be increased to 1,200 pounds

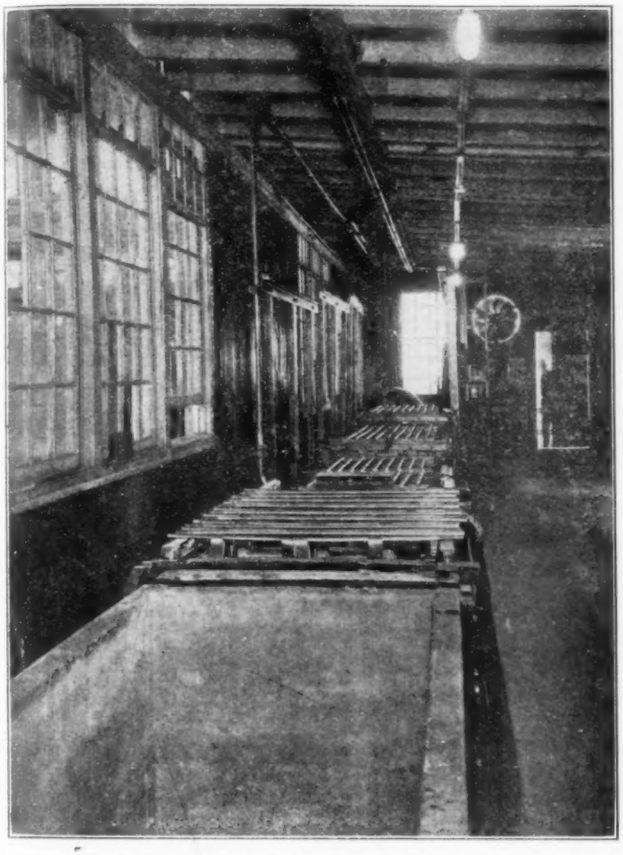


FIG. 3. A TANK USED FOR DEPOSITING A HEAVY COATING OF COPPER ON A STEEL PLATE.

of copper and 1,800 pounds of acid as the generator has a capacity of 60 kilowatts.

The installation of the recovery plant was under the supervision of Mr. F. P. Lauffer, mechanical engineer of

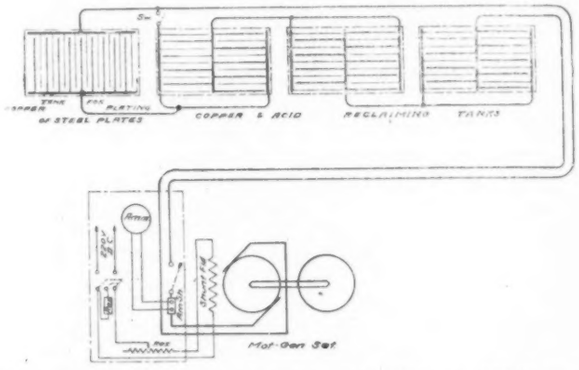



FIG. 4. DIAGRAM OF THE WIRING FOR THE ELECTROLYTIC COPPER RECOVERY SYSTEM.

the Research Division, Mr. A. E. Boggs, Works electrical engineer, and Mr. W. H. Gilleland, Works architect, Mr. F. L. Antisell, assistant superintendent of the Raritan Copper Works, Perth Amboy, N. J., and Mr. J. K. Bryan, manager of the Electrolytic Zinc Company, Baltimore, Md., criticised the plans and offered valuable suggestions.

## EXTRUDED METAL.

Metal wire and rod made by the extrusion process is coming more and more into common use, so that a little information about what the process is should be welcome.

Wire and rod have been made for many years by the drawing process, in which the metal is pulled through dies, gradually reducing its diameter or shape. Volume of production by this process was limited, first by the fact that attempts to reduce the diameter of the wire too much at one draught resulted in pulling the metal apart; and second, by the fact that the frequent annealings necessary to soften the wire consumed time.

By the extrusion process, the metal is pushed through the die while quite hot. Thus are overcome at once the two limiting conditions mentioned in wire drawing; the wire cannot break because you don't pull on it, and it does not get hard because it retains its softening temperature during the extruding.

This process has been used in producing lead wire and lead pipe for a number of years. The problem of extruding lead presents very few difficulties, however, as the softness of lead allows it to be forced through the steel die cold.

For lead extrusion, the necessary outfit consists of a multiple plunger pump, a hydraulic accumulator for storing water under high pressure, and a hydraulic press with attachments. Briefly, these attachments consist of a heavy steel cylinder with a die holding arrangement mounted on one end, the other end being adapted as to inside diameter, so as to form a close fit to the plunger or ram of the hydraulic press. In extruding lead wire a large piece of lead is put into this cylinder and the press started. Lead wire will flow continuously from the hole in the die until the ram reaches the end of its stroke. Naturally, some lead is left at the bottom of the cylinder, but the ram is withdrawn, another piece of lead put into the cylinder, and the ram started in again. Here is the interesting thing. During these two strokes of the ram there occurs no break in the lead wire; it is impossible to tell where the metal in the first piece of lead stops and that in the second piece begins.

In producing lead pipe a long arbor is used, the point of which enters the die n such a way as to make the orifice through which the lead must flow ring-shaped, or to be exact, shaped like a cross-section of the pipe.

Recognizing the possibilities of such a process, it was not long before experiments were tried, with the end in view of making brass rod and wire by the extrusion process. Difficulties at once arose. It was found that to get any results at all the metal must be quite hot during the extruding; it was found that hydraulic machinery of great power was necessary; it was found that the dies suitable for lead extrusion would not stand up under the heat. However, these difficulties have been overcome and there are now a number of firms who sell extruded brass rod. One of the good features of this process is the practicability of extruding the brass through odd-shaped dies, to give a certain cross-section, very expensive to get by ordinary methods.

In discussing this process, it is interesting to note how interdependent all processes are on something else. Without the gas engine we would not have the automobile or the aeroplane; without the railroads we could not have big cities; without the powerful hydraulic press we could not extrude brass.—Scovill Bulletin.

# BRASS FOUNDRY CORE-MAKING POINTS

An Address Presented Before the American Institute of Metals, Boston, Mass., September 24-28, 1917.

By H. M. Lane, H. M. Lane Company, Detroit, Mich.

The metal cost of brass and bronze alloys has always been so high, compared with the cost of the metals poured in moulds in ferrous shops, that any saving made in either mould- or coremaking results in a very much smaller percentage of saving in the finished product. This is one reason why the average brass foundryman has been slow to look after small economies in the core-room. Another reason is that the brass foundry core-room is usually rather small, employing only a few men. A dollar saved, however, makes just one hundred cents difference in the earnings of the company, and for this reason the brass foundryman should be as careful in his core-room savings as any other foundryman, even though the percentage of the turnover may be smaller.

### CORE-ROOM LAYOUT.

In laying out any core-room there are several factors to be taken into consideration. One of the most important is that of good light coming on to the bench from the right direction. Then there is the factor of accessibility; the bench should be so located that supplies can be delivered to it without interfering with the coremaker's work, and it should be unnecessary for him to carry his finished cores over a long distance. With the old style ovens, the coremaker's bench is very frequently located close to the oven, and the coremaker is required to do his own drying or baking. There are a good many objections to this course. The moment the coremaker is taken off production he becomes a laborer tending an oven. The strain of taking off a plate of hot cores, particularly with a pair of tongs, is considerable, and if the coremaker is making light, small cores, he will not be able to return to his work and proceed normally until his muscles have relaxed or recovered from the excessive strain incidental to moving a plate of cores. It is the same old story that a man cannot do heavy lifting work one moment and very fine measuring work the next. For this reason, the coremaker should not be asked to remove his own cores from the oven, even though he placed them in, for as a rule the sliding of a plate of cold or green cores into the oven is a much easier operation than the taking out of the hot plate.

### DELIVERY OF SUPPLIES.

The matter of delivering supplies to a coremaker is also important. Even in a comparatively small room, it pays to have one man whose duty it is to bend all wires and deliver them to the proper coremakers, and to see that they are always supplied with the proper kind of sand, with any other special material which they may require. The coremaker should never have to leave his bench to go in search of supplies of any kind.

### HANDLING OF CORES.

In trying to solve the problem of core handling the writer made several time-studies a few years ago. In one core-room employing eleven men, including the helpers, I found that a total of twenty-eight miles of walking a day was done in getting cores in and out of the oven. In other words, this was as though one man had carried a plate of cores fourteen miles out into the country and return. This is more than a day's work for one man, and more nearly a day's work for two men. In this particular core-room we rearanged the benches and the method of handling the cores, which enabled us to turn out the same amount of production with seven coremakers and laborers as we had formerly done with eleven.

These studies led to the development of the core-rack handling system, in connection with which we use a stationary rack and a lift truck. Standard racks are made 5 feet square and 5 feet 6 inches high, and each rack contains approximately one hundred and fifty square feet of drying surface. An ordinary drawer-oven of standard make has drawers 3 feet wide by 5 feet long, or fifteen square feet per drawer. This makes the rack the equivalent of ten drawers. In a certain case which we had under observation ten plates of cores were placed on a drawer, or one hundred plates of cores on a rack. In the case of the drawer-ovens, when the men were putting in their own cores the average distance from the bench to the drawer was a little over twenty-five feet. When we used racks we placed them close to the coremaker's bench, so that the average walk was a little less than ten feet. This represented a saving of fifteen feet for a plate of cores each way, or a total saving of thirty feet of walking in putting a plate of cores on the rack and returning to work. For one hundred plates, or a rack full, this made a saving of three thousand feet, or over a half a mile's walking.

We are often met with the statement that "my foundry is too small for a rack-type oven." The writer, however, believes that this is subject to careful study in each case, for in many instances it is undoubtedly true that one rack-type oven would do better work than a small battery of drawer-type ovens. As a rule, the writer does not advocate an oven drying a single rack, as we have found more fuel economy in placing two racks in the oven tandem, and the first cost of the oven equipment is much less. In brass foundries, however, there are cases where it pays to install the single-rack type of oven, on account of the fact that the total output is small and, divided between cores, require quite radically different drying periods. In the case of a small oven the racks, of course, are handled with a hand-lift truck.

### CORE-OVEN AND CORE-ROOM FLOORS.

The matter of core-oven and core-room floors is one that should receive very careful attention. We have had some core-oven floors stand up remarkably well and others fail, and I have finally come to the conclusion that where concrete floors are used, both in ovens and core-rooms, their durability depends to a large extent upon the material from which the floor is made and the manner in which it is cured or given its initial set. The writer has seen floors which have stood up under heavy trucking for years with no appreciable wear, and, on the other hand, has seen concrete floors go to pieces in a few weeks. The aggregate of which the concrete mixture is made must be composed of touch, and at the same time hard, material. Granite chips, or trap rock, with good sand and cement, make the best floor, and when it is laid the mixture should be thoroughly wet and should be mixed for from five to ten minutes in a concrete mixer. We have found that this length of time for mixing is important. After the floor has been laid and troweled or floated, in place, it should be given a cover of sand or sawdust, which should be kept damp for not less than a week, and preferably ten days. A floor thus laid generally gives excellent results.

There are many so-called floor hardeners on the

market, all of which are essentially composed of cast iron dust. About twenty years ago the writer started some experiments on floors for foundry gangways. In some of the early attempts we simply took iron borings and added enough cement and sand to bind them together. These floors stood up very well and did not spawl or fly when metal was spilled on them. An ordinary concrete mixture will not give good results under metal, for if metal is spilled on it the immediate surface will expand rapidly and the concrete, being a poor conductor of heat, does not carry the heat down into the mass, so that this highly expanded surface spawls or breaks off. To overcome this I advocated the use of cast iron borings to increase the conductivity of the mass, and by placing ten per cent by volume of cast iron borings in the mass for from three to five inches from the surface we found that the heat conductivity was so increased that the heat ran down into the mass and expanded the entire floor without forming a rupture line which resulted in scalping. In our first experiments along this line we used rather coarse borings, that is, the turnings, just as they came from the lathe. Later we found that better results were obtained after passing the borings through a twenty-mesh sieve. We have laid thousands of square feet of foundry and gangway floor with this mixture, with excellent results. The borings should be free from oil before being sifted, and should be made from as hard an iron mixture as is available. Ordinary automobile cylinder or piston turnings are very good.

Where the concrete mix contains soft ingredients, as soft white limestone or friable sandstone, it will not stand up under trucking either in the oven or out of it.

In some recent installations we are using iron plates inside the oven, to get away from any trouble from concrete floors.

The question of breakage when cores are handled on a lift truck often comes up. One very prominent foundry carried on very extensive experiments along this line, and their tabulated information shows that they reduced the breakage two-thirds by introducing rack-type ovens and handling all of their delicate cores on racks. In their case, however, they had very good concrete floors, and the racks were handled with an electric lift truck fitted with rubber-tired wheels.

### SAND MIXTURES.

In brass foundry work we are dealing with certain alloys that have great searching power. This is particularly true of some of the high phosphorous alloys. To make a core that will leave a smooth surface without any tendency of the metal to search into it necessitates using core sand of fine grain. The moment we adopt a fine grain core sand the question "will it vent?" next presents itself. Contrary to the old belief, core sand should not be angular in grain, but should be as nearly spheres as possible. If we had a room filled with two-foot spheres or big cannon shot, we would have a certain amount of vent or air space between these spheres. If the same room were filled with bird shot of uniform size, we would still have exactly the same amount of air or vent in the room, the reason being that in both cases we have the relationship between a cube and a sphere, which is a geometric relationship, and increasing the number of cubes or spheres keeps the ratio exactly the same, so long as all the spheres are the same size. If, however, we have a given space filled, we will say, with spheres the size of buckshot, we can then pour a lot of bird shot in between them, but the bird shot will take up part of the vent space. The same is true in dealing with sand. If we can find a sand with round grains of the same size, we will have the maximum vent, no matter what the size of the grain. For instance, Michigan City sand, which is a wind-driven sand occurring on the east shore of Lake Michigan, is as a rule very uniform in grain size and over eighty per cent of it will pass through a forty-mesh sieve and stay on sixty- and eighty-mesh sieves. This shows a fair uniformity in size and explains the remarkable venting power of this sand.

In our search for core sand, if we can find a bank of wind-driven material, we can be assured of a fairly uniform sized grain, and if the vents or spaces between the grains are so small that the surface tension of the liquid metal will not allow it to flow into this small space, we will then have a material from which we can make cores that will give a smooth interior surface to the casting and get rid of searching. The other alternative is to treat the core with some facing material, as, for instance, a wash of silica flour.

In selecting core sand for oil sand cores it is important to test the sand and see that it is free from clay or loam. These testing methods have been described quite fully in other papers in the past.

Each individual core-room presents its own problems and should be studied with great care before any decision as to the final equipment is reached. One of the greatest mistakes a foundryman can make is to just build a room and then try to make a core-room out of it.

### CORE STORAGE.

Even in the case of a small foundry, it pays to have a system for inspecting and storing cores, and then delivering them to the foundry. In a number of cases a system of this kind has paid for itself in a remarkably short time, on account of the fact that, in the first place, over production was guarded against, and in the second place, with a properly laid out system the moulder is never short of cores to complete a day's work.

We have also observed in a good many foundries that moulders get careless in regard to cores. The writer has seen cases where a moulder had four or five cores left in a box at night, and in clearing up around his floor, rather than try to take care of these, he simply dumped them out on the gangway and sent the empty box back to the coreroom. By giving a man the proper number of cores to core up his day's work, with a due allowance for breakage, and then holding him responsible for the cores, a great saving can be effected

### SOLDERS FOR SPECIAL PURPOSES.

| | Gold. | Silver. | Copper. | Zinc. | Brass. | Nickel. |
|---|---|---|---|---|---|---|
| Silver solder for plating | .. | 2 | .. | .. | 1 | .. |
| Silver solder for silver, brass, iron | 1 | .. | .. | .. | 1 | .. |
| Silver solder for steel | .. | 19 | 1 | .. | 1 | .. |
| Hardest silver | .. | 4 | 1 | .. | .. | .. |
| Hard silver | .. | 3 | .. | .. | 1 | .. |
| Soft silver | .. | 2 | .. | .. | 1 | .. |
| Brazing fine steel | .. | 19 | 1 | .. | 2 | .. |
| Gold solder | 6 | 1 | 2 | .. | .. | .. |
| Solder for copper, brass, iron | .. | .. | 2 | 1 | .. | .. |
| Solder for copper, brass, iron | .. | .. | .. | 1 | 5 | .. |
| Solder for copper, brass, iron | .. | .. | 1 | 1 | .. | .. |
| Soft German silver solder | .. | .. | 4.5 | 7.0 | .. | 1.0 |
| Soft German silver solder | .. | .. | 35.0 | 56.5 | .. | 8.5 |
| Hard German silver solder | .. | .. | 3.8 | 50 | .. | 12 |
| Solder for steel joints | .. | 28½ | 1½ | .. | 3 | .. |

# RECENT INDUSTRIAL USES OF ALUMINUM

A Paper Presented Before the American Institute of Metals, Boston, Mass., September 24-28, 1917.

By F. G. Shull, Aluminum Company of America, Boston, Mass.

I have been asked to prepare a paper on the recent industrial uses of aluminum. This is sufficiently indefinite to make it a little difficult to know just where to begin or what branches of the aluminum industry to cover. I have, however, chosen to refer to the following materials, practically all of which have reached states of commercial importance during quite recent years:

Aluminum foil.
Aluminum bottle caps and jar closures.
Manufactures, involving autogenous welding.
Die and pressed castings.
Tubing for store service.
Rolled rod for machining purposes, and
Aluminum conductors, steel reinforced.

The aluminum foil industry has grown from practically nothing to a volume of business involving many tons of aluminum annually. At that start, the product consisted principally of plain foil, not appreciably unlike plain tin foil in appearance, which was used for wrapping candies, chewing gum, teas and the like. Later on the development of the process for embossing and printing aluminum foil opened up a large field among manufacturers of chocolate bars, cheese, toilet soaps, etc., so that to-day a very considerable tonnage of this foil is being used in the embossed and printed form.

Plain foil is being used to some extent in electrical condensers. A most recent use for plain foil, which has, as yet, just barely started, is for the lining of pulpboard cartons for the packing of coffee. This combination package possesses moisture resisting and oil retaining characteristics not inferior to the tin can, as a coffee container.

Aluminum bottle caps and jar closures on the market, known as the "Goldy" seal, have, like foil, advanced from a meagre beginning to a business of substantial proportions during a very few years. They are being used on practically all food products put up in glass, such as grape juice, fruits, preserves, ketchup, pickles, salad dressing, and so on. While this seal possesses the non-refillable feature and requires no opener to remove, it owes its success, in a great degree, to the fact that it is aluminum, which is known to be non-rusting and strictly hygienic.

The development of a process of welding aluminum by means of the oxy-hydrogen and oxy-acetylene flame has opened an almost limitless field for the outlet of aluminum. Sheet aluminum of all gauges heavier than about 1/32 of an inch can be readily welded and the seam dressed off so that it is difficult to locate the joint. Consequently it is possible to build up an aluminum tank or container of almost any size and shape which, when welded together, is practically a one-piece job. This class of material finds a place in breweries, ginger-ale plants, milk depots, chemical plants, and, in fact, wherever seamless metallic non-rusting containers are wanted. The one-piece feature is of marked advantage over the riveted tank, which is always liable to spring aleak.

For a long time it has been considered a difficult proposition to die-cast aluminum. At the present time, however, this problem seems to have been solved, as there are several companies that claim to be successfully die-casting this metal.

Another quite recent development is the subjecting a sand castings to very high pressures in order to render the metal more dense and to increase the strength. Such castings have found use in the making of parts for the timing devices of shrapnel, it being found that these castings not only possess extra high strength, but that they also machine exceptionally well.

Aluminum tubing for pneumatic store service is not a new field for aluminum, strictly speaking, since it has been gradually coming into use for the past several years. It is a fact, however, that the last few years have seen the volume of aluminum consumed for this purpose reach a stage where the tonnage involved is of very great importance. The natural characteristics of the metal itself principally recommend it for this use.

One of the most interesting developments in the aluminum industry of recent years is the rolling of high alloy rods in practically all commercial sizes. In the past, commercial aluminum rod has been largely a drawn product. This method of manufacture prevented the use of aluminum alloyed with any appreciable percentage of other metal, for the reason that in the drawing operation the surface, principally, of the rod is worked. The result is that the surface becomes hard, while the body of the rod is left comparatively soft. Therefore, only the smaller sizes of drawn rod are suitable for machining.

By the rolled method of manufacture not only is it possible to use highly alloyed metal, but also the process tends to work the entire mass of the rod so that the finished product is a good uniform homogeneous material which machines well throughout its entire substance. This process, therefore, makes available a good machining aluminum rod in all commercial sizes for automatic machines and turret lathe products.

One of the first uses for which this rolled rod was tried was for the machining of the fuse-timing parts for shrapnel. While it worked perfectly for this purpose, it so happened that the principal timing parts were of such a shape that in making them from rod it was necessary to cut away a great deal of the metal, resulting in high scrap loss. It was found that sand castings of the general shape of the parts to be made could be subjected to a compression process and rendered highly satisfactory for this purpose, with a minimum of scrap loss. Consequently, as a commercial proposition, the rolled rod could not compete with the compressed castings for this particular article. It will, without doubt, however, find wide usage for automatic machine products.

Aluminum cable, steel reinforced, is not a very recent aluminum product, it having been in commercial use on an extensive scale for the past few years. It is, however, sufficiently little understood to seem to warrant reference being made to it under the title of this paper.

The excuse for the existence of such a product as steel reinforced aluminum cable lies in certain inherent characteristics of aluminum which needed improvement in order to recommend its use for long span, high voltage work. The particular characteristic to which I refer is the coefficient of expansion of aluminum, which is approximately 1/3 greater than that of copper. Due to this greater expansion, the aluminum line lengths a little more with temperature rise, and shortens a little more with temperature fall, than copper. The result is that it is necessary to string aluminum wire with greater sags than copper wire in order that its strength may not be overtaxed at low temperatures. By allowing this greater sag at ordinary temperatures, combined with the higher coefficient of expansion of the aluminum

referred to, one is apt to get excessive sags at extremely high temperatures in summer.

This was a condition of comparatively little importance in the early days of low voltages and short spans, but with the advent of higher voltages and long spans, steel tower construction, the characteristics of aluminum cable, as referred to above, became a serious menace to its commercial existence.

What aluminum cable lacked was high tensile strength and low coefficient of expansion. In order to impart these characteristics it was proposed to make the centre strand of a 7-strand cable, of steel and the 6 outer strands, of aluminum, the steel to furnish the strength and the aluminum the electrical conductivity. A very high grade plow steel wire was selected, which was triple galvanized to prevent corrosion, and the practical tests which followed proved that the theory was correct; that the composite cable took on characteristics different from either of the component metals, and was highly satisfactory for long span work.

It is found feasible to construct these cables with any standard number of strands, varying the proportion of steel and aluminum to meet the particular strength and sag conditions required.

Aluminum cable, steel reinforced, began to grow in favor from the start, so that today many of the most modern transmission lines on the American continent are built with this cable.

This, in a general way, will give a hint as to some of the more recent uses of aluminum. The automobile industry is, of course, the big factor in the aluminum business today, but the relative importance of some of the other fields for this metal seem to be greatly on the increase.

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# THE USE OF BRONZES IN RAILROAD TURNTABLES AND MOVABLE BRIDGES

A Paper Presented Before the American Institute of Metals, Boston, Mass., September 24-28, 1917.

By O. E. Selby, Principal Assistant Engineer, the Cleveland, Cincinnati, Chicago and St. Louis Railroad Company.

## DESCRIPTION OF CONDITIONS AND REQUIREMENTS

1. The uses of bronzes in the structures included in the title of this paper and the consequent requirements for their qualities differ materially from the uses and requirements of ordinary machinery practice. Turntables and movable bridges are, for the purposes of this subject, to be considered as big machines, but they differ from usual machines in that the motion is slow and intermittent, the pressures are high, and in many cases the motion is through only part of a full revolution.

2. It is only in recent years that bronze bearings have been used extensively for the main bearings of these structures and the development of materials to meet the requirements has followed the appreciation of those requirements. Formerly turntables (except the Greenleaf type, which had a cast iron center disc bearing) were carried on a center pivot containing a nest of conical steel rollers. This type is still in common use and has many staunch advocates, but the use of a disc bearing center pivot has been increasing to such an extent that the design of such bearings has reached pretty well defined standards.

3. The fundamental feature of a disc bearing center is that there shall be a bronze disc turning between two hardened steel discs. The lower steel disc is fixed in the stationary pivot; the upper one is fixed in the center of the moving turntable. The bronze disc is confined laterally by the walls of the disc box, but otherwise is free, and turnings accrue on either its top or bottom surface, which ever happens to offer the lesser resistance. The bronze disc may be lenticular in section, and the steel discs concave, or all may have flat surfaces. The flat surfaces are coming into more common use as there is no apparent reason for the more expensive lenticular shape, if the tilting of the superstructure is taken care of otherwise.

4. The discs range from 14 to 24 inches in diameter. They carry the entire weight of the turntable superstructure and the locomotive, the load being balanced while turning. The resulting pressure on the disc ranges from 1,500 to 3,000 pounds per square inch in good designs. The desideratum is that the load may be turned with the least force. It does not follow that the turntable with the lowest unit bearing pressure will meet this condition, for the reason that the resulting large disc gives the frictional resistance a larger effective radius. Therefore, the disc must carry the load at a high bearing pressure and with a low coefficient of friction. This requires a hard bronze, much harder than for ordinary machinery bearings. Moreover, the quality of the bronze and the condition of the lubrication must be such that there will be no bad effect from intermittent use at irregular periods.

5. What has been said about turntables applies without change to center bearing swing bridges except that the bridge carries only the weight of the moving span and the discs are larger; some as high as 42 inches in diameter have been furnished.

It goes without saying that bronze discs as heavy and expensive as these must not be subject to much uncertainty as to their quality. This requires the most carefully considered specifications and the highest skill in the bronze foundry.

6. The other type of movable bridges, those moving in a vertical plane such as bascule and lift bridges, require bronze lined trunnion bearings of great size. These trunnion bearings are subject to the same conflicting conditions as between low unit bearing pressures and large radius of frictional resistance. The motion is slow and, on account of only partial rotation, the lubrication is difficult.

7. Discs and large trunnion bearings may then be said to constitute the *special* uses of bearing metals in turntables and movable bridges. The bridge machinery and the turntable truck wheels call for bearing metals like those in other heavy machinery except that the difficulty of renewals and the consequences of a shut down make the integrity of the bearings of the highest importance.

8. Naturally, in the early periods of the development of the special uses of bronze in these structures, recourse was had to the knowledge of the bronze founders which, of course, was limited to their experience in producing bronze for the common uses. Some exasperating failures led the designing engineers to look into the subject, and to attempt to break through the wall of secrecy with which the founders surrounded their art. It is not surprising that the attempt to enforce specifications in an art requiring so much of skill and special knowledge was

resented, but finally there have been developed a few bronze foundries in which the most highly scientific methods are used with correspondingly reliable and uniform results.

9. The necessity for uniform specifications for bronzes for the special uses here considered led the Committee on Iron and Steel Structures of the American Railway Engineering Association in 1914 to take up the study of the subject. The report and specifications which were developed by a sub-committee of which the writer was chairman are printed in the proceedings of the 17th annual convention of the association beginning at page 104. On account of the writer's association with the report, it will not be out of place to extract freely from it, as is done below, without the credit of quotation marks. No attempt is made to repeat for the members of the American Institute of Metals the merely historical and elementary parts.

10. The physical properties desired in bronze depend on the use to be made of it. For machinery bearings with low pressure and high speeds, under constant operation, the strength of the bronze is less important than its anti-friction and wearing qualities. For bearings of movable bridge trunnions and discs, turntable discs, and similar slow moving parts operated infrequently and carrying heavy pressures, the bronze must be hard enough and strong enough in compression to reduce friction to a minimum and not to flow or distort under the pressure. For worms, gears, nuts, etc., the bronze must have tenacity and hardness as well as anti-friction and wear resisting qualities. The differentiation of bronzes according to the uses mentioned is a matter of recent years; the earlier practice was to use one kind for all purposes.

11. The hardness and strength of bronze increase with the amount of tin. The introduction of lead improves the wearing qualities and softens the metal besides cheapening the product. Zinc increases the tensile strength but is injurious to the alloy for bearing purposes. It should not be used except in bronze for the third purpose mentioned above and then only in small quantities, as too much causes a segregation of the tin and the formation of hard "tin spots."

12. It appears that the introduction of lead decreases the wear but increases the friction. A table of experiments by Clamer printed in "Lubrication and Lubricants" by Archbutt and Deeley shows that, while the wear decreases proportionately with the increase in lead, the friction in the cases of lead exceeding five per cent. was as high as forty per cent. greater than in cases having no lead. These results are said to have been confirmed by Spare in the Cornell laboratory. There are no definite experiments known which show lead to improve the anti-frictional qualities.

13. The necessity for a harder bearing metal for heavy pressures has developed a series of formulas containing upwards of 20 per cent. tin and no lead. The metal produced has an elastic limit in compression of from 24,000 to 40,000 lbs. The permanent set under 100,000 lbs. on a one square inch cylinder one inch high is from 1/16 in. to 1/10 in.

14. A considerable number of engineers believe in specifying the physical properties only and leaving the chemical composition to the maker. Others modify this course by stipulating certain control over the formula, but making the physical requirements the criterion for acceptance.

15. The third class of bronze, that requiring high tensile strength, is best secured by the introduction of from one to two per cent. of zinc. This constitutes gun-metal. For this purpose the ultimate tensile strength and percentage of elongation seem to be more proper physical requirements than the compression characteristics.

### SPECIFICATIONS AND THEIR DISCUSSION.

#### Specifications for Bronze Bearing Metals for Turntables and Movable Railroad Bridges.

1. Phosphor bronze shall be a homogeneous alloy of crystalline structure. It shall be made from new metals, except that scrap of known composition produced by the foundry at which the bronze is cast may be used. It shall not contain sulphur. The phosphorus shall be introduced in the form of phospher-tin or phosphor-copper. Castings shall be sound, clean and free from blow-holes, porous places, cracks and other defects.

2. The alloy shall be cast into ingots and allowed to cool and the castings shall be poured from the remelted ingots. Care shall be exercised that the metal is not overheated and that the temperature at pouring and the conditions of cooling are such as will be most likely to secure dense castings.

3. There shall be four grades.

*Grade A* is to be used for contact with hardened steel discs under pressures exceeding 1,500 pounds per square inch, such as are used in turntables and center bearing swing bridges.

*Grade B* is to be used for contact with soft steel at low speeds under pressures not exceeding 1,500 pounds per square inch, such as trunnions and journals of bascule and lift bridges.

*Grade C* is to be used for ordinary machinery bearings.

*Grade D* is to be used for gears, worm wheels, nuts and similar parts which are subjected to other than compressive stresses.

*4. The chemical and physical qualities shall conform with the requirements in the following table:

| | GRADE | | | |
|---|---|---|---|---|
| | A | B | C | D |
| Copper per cent | 80 about | 85 about | 80 about | 88 about |
| Tin per cent | 20 about | 15 about | 10 about | 10 about |
| Lead per cent | ..... | ..... | 10 about | ..... |
| Zinc per cent | ..... | ..... | ..... | 2 about |
| Phosphorus per cent | 1.0 max. | 1.0 max. | 1.0 max. / 0.7 min. | 0.25 max. |
| Other elements per cent | 0.5 max. | 0.5 max. | 0.5 max. | 0.5 max. |
| Elastic limit in compression, pounds per square inch | 25,000 min. / 40,000 max. | 19,000 min. / 23,000 max. | 15,000 min. / 20,000 max. | 14,000 min. / ..... |
| Permanent set under 100,000 pounds | 0.06 min. / 0.10 max. | 0.12 min. / 0.25 max. | ..... / ..... | ..... / ..... |
| Yield point in tension, pounds per square inch | ..... | ..... | ..... | To be recorded |
| Ultimate strength in tension, pounds per square inch | ..... | ..... | ..... | 33,000 min. |
| Elongation in 2 inches per cent | ..... | ..... | ..... | 14 min. |

* See suggested revision at end of paragraph 37.

5. The chemical analysis of each heat shall be furnished.

6. Test specimens shall be made from coupons which are a part of the casting and which have been fed and cooled under the same conditions as the casting.

7. Compression test specimens shall be cylinders one inch high and of one square inch area. The elastic limit in compression shall be the load which gives a permanent set of 0.001 inch.

8. Tension test specimens shall be turned from a coupon not less than one inch in diameter to the form shown in Fig. 2 of the American Railway Engineering Association General Specifications for Steel Railway Bridges. The diameter of the turned specimen shall be one-half inch.

9. At least one compression test shall be made from each melt for Grades A, B and C; and one compression and one tension test for Grade D. For castings weighing over 100 pounds, finished, the prescribed tests shall be made for each casting.

10. The hardness of the finished castings shall be tested by the Brinell ball method and a record of the test furnished. The ball shall be of hardened steel 10 mm. in diameter. The load shall be 500 kg. and shall be applied for 30 seconds to a finished plane surface. At least two hardness tests shall be made upon each heat. A test shall be made on each trunnion bearing and each disc.

DISCUSSION OF SPECIFICATIONS.

16. The specifications which accompanied the report are given above. They were submitted tentatively in the hope that their use would develop whether they were suitable and practicable or not. It is to be regretted that little of such use has been made. One of the bronze makers in the Pittsburg district, who does a good deal of bridge bronze work, said early this year that he was not aware that such specifications had been formulated.

17. The writer has, by conferences and correspondence with interested experts, found out some of the points in the specifications on which differences of opinion exist. They all relate to Clause 4, and are:

a. The use of both chemical and physical requirements.

b. The use of the elastic limit in compression.

c. The extent to which the Brinell hardness number may be used as a criterion of quality.

d. The proper limits of permanent set.

18. It will be necessary to discuss all four of these points together. The inconsistency of specifying both chemical composition and limitations of physical qualities is well known and admitted. It is to be noted that the specifications do not attempt to give more than the approximate chemical composition. The use of the word "about" after the contents of copper, tin, lead and zinc has caused some misunderstanding, however. The makers seem to feel bound by the figures and the degree of latitude to be allowed is not indicated. The representative of a prominent bridge company told the writer that his company had tried to manufacture bronze to Grade B and had failed to keep within the physical requirements, and that later they had tried to get the bronze made by bronze companies who refused to quote on these specifications. Plainly, the use of the word "about" has been misleading, and what was intended largely for information as to the chemical make-up which might be expected to produce the physical qualities desired, has been interpreted to be control of the chemical composition.

19. That there should be some degree of chemical control, however, there are good reasons for. This does not refer to the limitation of the deleterious ingredients, the desirability of which nobody questions, but to the control of the makeup ingredients, copper, tin, lead and zinc. The principal reasons are that an excess of one of the beneficial ingredients (such as tin) may produce a deleterious effect, and that the control of the physical qualities is not reliable enough to be used independent of knowledge of the chemical composition.

20. An increase of tin content increases the hardness, which may be desired, and also the brittleness, which never is desirable. There must then, for each grade, be a point of sufficient hardness and unobjectionable brittleness where the tin content must stop. The limits are narrow; that is one reason bronze founding is an art requiring great skill. If we could measure the hardness and the brittleness exactly, we might fix their limits and let it go at that, but unfortunately we have no such exact control of those qualities and we must have the further protection of a limit to the tin content.

21. Similar remarks apply to the ingredients other than tin. Lead in any quantity is objectionable in Grades A and B, and zinc is not beneficial in Grade C.

22. The case is analogous to that of an important railroad crossing which must be guarded by both gates and flagmen.

23. Mr. George H. Tinker, in his paper published as a part of the committee report mentioned above, says, "It is recognized that neither compression nor hardness tests on bronze always give concordant results, owing to the effect of various conditions of manufacture. That is one very good reason for controlling the chemical composition within narrow limits."

24. Curves showing plotted experiments by Thurston (Proc. Inst. Mech. Engrs., 1895), show that beyond about 18 per cent tin content, the tensile strength falls rapidly and the elongation is practically zero. Should the founder then be allowed to increase the tin content without limit to meet some perhaps ill considered hardness requirement?

25. The purpose of physical tests of any material is the determination, directly or indirectly, of the qualities desired for the purpose for which the material is to be used. If the use to be made requires principally tensile strength, naturally tensile strength is the quality tested. In the case of other uses, the direct testing of the qualities desired is not so simple.

(To be continued.)

## FRENCH METHOD OF TINNING CAST-IRON VESSELS.

A method of tinning cast-iron pots and other utensils for domestic use is offered from a French source, La Chronique Industrielle. For household utensils only pure tin should be employed and not tin and lead, as the latter forms poisonous salts with the acids of food products. To insure adhesion of the tin the iron should be treated to remove the carbon or otherwise it should be polished by mechanical means. To remove the carbon, the iron is coated with a layer of oxide of iron or manganese or else the iron is enclosed in a box with the oxide and maintained at a high temperature to burn out the carbon. After four to six hours the iron is sufficiently decarbonized to permit the adhesion of the tin. After this procedure the iron is cleaned with dilute sulphuric acid to which is added a small amount of blue vitriol. The iron is then immersed in molten tin; or, if the interior of a vessel is to be coated, molten tin with a little sal-ammoniac is vigorously rubbed over the surface. It is prefereable to heat the iron before applying the tin. This must be done with care, otherwse the surface will be oxidized and impair the adhesion of the tin.

# EDITORIAL

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## CONVENTION SUGGESTIONS

To arrange and carry out smoothly the plans for a yearly convention and exhibition such as that which just ended in Boston, Mass., September 28, 1917, is no small task. All honor, therefore, to those in charge of the Foundrymen's Convention and Exhibition for 1917, an account of which we give in the opening pages of this issue of THE METAL INDUSTRY.. There must be understood that in the conduct of an affair of this kind there are a number of conflicting factors to be taken into consideration and it is a most difficult matter to please everybody. There are bound to be criticisms no matter how hard and strenuous have been the labors of those charged with the success of the affair. When criticism, however, takes the form of suggestions which have for their object solely the idea of improving and perfecting the details of a huge task, no one can take offense. It is in this spirit, therefore, that we venture to offer a few ideas to be applied to future conventions.

First, in reference to the wealth of entertainment offered at the Boston Convention. We are sure that no one connected with the entertainment committee had any idea in arranging the program other than to make the stay of the visitors to Boston as entertaining as possible and to make them remember their visit with pleasure. We recognize the fact that Boston has so much to offer in the way of historical interest that it is difficult to know what to choose. However, when three afternoons of an all too-short week are given up to sight-seeing and other diversions it leaves little time to visit the exhibitions. It seems only fair to the one hundred and sixty-five firms who spent time, energy and money in staging their exhibits that they should have an adequate audience. In this connection then we would suggest that the entertainment program be shortened to one afternoon and whatever else that may be planned take place in the evenings after the show has closed. We believe in the adage as much as anybody "that all work and no play makes Jack a dull boy," but on the other hand we think that if steps are taken so that business and pleasure will not interfere as much as they did in Boston, more people will be satisfied and better results obtained. The pleasure afternoons could come the last of the week.

In reference to the papers that are read at the scientific sessions, it seems as though it would be a good plan to limit the time allotted to each one, say ten or fifteen minutes, long papers being abstracted or read by title and thus leave more time for discussion which is really the life of the convention. When one paper takes over an hour for its reading alone it becomes rather tiresome to sit on a hard chair and listen to it, especially if one

has attended that particular session to hear another paper which is not even reached in a morning's deliberations. Also we cannot blame the author of a paper listed to be read at a session for his impatience when he has made plans to be present and finds his paper crowded out of the programme.

There was some discussion at the Boston meeting of the American Institute of Metals as to the advisability of evening sessions. It seemed to be the sense of the meeting that the members were in favor of it. We rather agree with Mr. Bassett that evening sessions would result in more of these informal gatherings of kindred souls interested in like subjects that are a pleasant feature of a once-a-year meeting. So let some ruling be made that speakers or readers of papers be limited as to time, also that authors of papers be urged to get them into the hands of the editor early in the year so as to allow time for pre-printing, thus insuring studied discussion. And lastly let there be evening sessions which would allow of cutting down somewhat the days of the convention and in this way conserve the time of the delegates. This latter consideration is quite important as it would enable one to either get back sooner to his industrial activities or visit an overlapping convention and thus kill two birds with one stone. This year it was not possible for the Boston visitors to attend the Electro-Chemical Exposition held in New York the same week even though we know there were a number who would have liked to have done so.

Just a word about good air. The air in enclosures or rooms where people congregate is never any too pure so we would suggest that smoking be refrained from at the meetings of the societies and in the exhibition halls. In the meeting rooms it might mean air more pleasant to breathe and in the exhibition hall not only that but would also cut down the fire hazard which is always greater where promiscuous smoking is indulged in.

## LIBERTY BONDS

As we go to press there is another Liberty Loan being offered to the public. Now is the time for every one to do his utmost to put into the hands of the Government the most potent weapon with which to win the war. This weapon is money and it is within the power of everybody to provide it. This is the time for the small investor to come forward and give his bit. The United States does not ask anyone to Give their money but to Loan it at four per cent. on the best security on earth, the bond of the United States of America!

Now is the time to realize that the great American game of bluff, of splurge, of pretension and show in living has no place in war time. The more it is squeezed out of our lives and our budgets the more money we can save, the more we can help our country in the most vital of all ways, buying its Liberty Bonds to make our fight possible.

Most of us realize this truth in a general way. But a good many of us are feeling the pinch of high prices to such an extent that extravagance looks in our own cases like a remote and forgotten sin. What is worth emphasizing and repeating is that the American desire to put the best foot forward, to make a noise like success, let the bank balance show what it may, is too ingrained to die quickly and that there are very few of us, even including those pinched between high costs and fixed salaries, who could not eliminate certain extravagances if we would and who could not live more simply if we felt free to try.

The American spirit of competition that rules every social community up and down the scale of income is not altogether vicious. It is probably an essential part of our system of free opportunity that raises a telegrapher into the job of a railroad president and sends his grandson down hill. What is entirely vicious now is the perpetuation of that spirit in the least degree, to the destruction of saving urgently needed by our Government.

Courage and leadership should set precisely an opposite spirit to the front in every community. The goal of competition should on the contrary now be, how simply can we live? At the top of the scale it may mean anything from last year's limousine to next year's cottage. At the bottom it may mean one less movie or last year's hat. The amount of needless spending, the amount of possible saving is not the point. The point is that every one of us should talk, preach and act economy. Every community ought to get down to common sense dressing and common sense entertaining. The family most respected ought to be the family that makes the greatest sacrifices of extravagances and that succeeds in reducing its living expenses to the simplest, most sensible scale and then puts the greatest proportion of its saving into Liberty Bonds.

## NEW BOOKS

**Technical Analysis of Brass. Second Edition. By William B. Price and Richard K. Meade. Size 5¼ x 8 inches. 370 pages, including index. 24 illustrations. Published by John Wiley & Sons, Inc. For sale by THE METAL INDUSTRY. Price $3.00.**

This work shows careful revision by the authors and contains many changes which were based on helpful criticisms received after the publication of the first edition and an effort has been made to bring this particular edition up to date. Among the additions to the subject matter which are to be found in this book are the directions given for the analyses of such alloys as chromium, titanium, and vanadium copper which will be found in part three.

There are also schemes for the determination of antimony and babbitt, manganese and nickel in copper alloys and standard methods for the analysis of spelter, the battery assay of copper and an accurate method of determination of cadmium in brass, especially in the presence of arsenic. There is also added a chapter on the analysis and control of plating solutions which certainly will be of great value not only to the plating fraternity, but also to the chemist. The authors express grateful appreciation for the help in compiling the work to a number of prominent metallurgists, chemists and platers.

---

**Principles of Iron Founding. By Richard Moldenke, Ph.D. Size 6½ x 9¼ inches. 518 pages including index. 45 illus-**

**trations. Published by the McGraw Hill Book Company. For sale by THE METAL INDUSTRY, Price $4.00.**

The object of this work, according to the author's preface, is the elucidation of the principles underlying all of the processes involved in the art of iron founding. Dr. Moldenke's long association with the foundry as a practical worker and also his connection with the theoretical side of the metal industry, as he has been a professor of engineering at an American mining school and his connection with the foundrymen of America as secretary of their association for seven years has made him eminently qualified to produce a work such as the present one, which will serve as a valuable work of reference.

The work goes into the elements of iron making and its allied industries with the object of drawing conclusions therefrom of value to the foundryman in his daily work and we have no hesitation in saying that Dr. Moldenke has most ably carried out his desires. The work also contains an appendix which treats of standard specifications for various kinds of iron adopted by the American Society of Testing Materials and also gives methods of sampling and chemical analyses of the composite constituents of various kinds of iron.

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**Transactions of the American Institute of Metals—Volume X, 1916. Size 6½ x 9 inches. 332 pages with index and list of members. Issued by the Society.**

The long looked for Volume X, being the report of the annual meeting held by the Institute at Cleveland, Ohio, September 11 to 15, 1916, has just made its appearance. This work, while it does not contain in the aggregate as many pages as its predecessor, Volume IX, makes up in quality that which it has apparently lost in quantity.

The papers which were presented before the meetings of the Institute at Cleveland are published in full together with the discussions which took place following their reading and which always add so much value to the presentation of a paper.

It is generally understood that this work is obtainable only by members in good standing of the Institute, but the secretary announces that there are on hand a limited number of volumes which may be had by non-members for $6.

# CORRESPONDENCE AND DISCUSSION

WE CORDIALLY INVITE CRITICISMS OF ARTICLES PUBLISHED IN THE METAL INDUSTRY

## WHO'S TO BLAME?

To the Editor of The Metal Industry:

In the August issue of the *Review*, which is the official publication of the American Electro-Platers' Society, there appears an article by Dr. Scott, read at the St. Louis convention of the American Electro-Platers' Society. The article deals with the cleaning problem and the discussion that followed.

One of the most important operations of the plating business is to have the work absolutely clean; it must be free from oils, grease and stains to receive an adherent deposit, as cleaning is fully 50 per cent. of the plater's troubles. To realize the importance of the cleaning agent one has but to look through the various trade journals and note the numerous advertisements dealing therein.

The writer has done considerable experimenting with the various cleaning agents and investigated their merits, and I have still to see the high priced cleaner do as good work as one I have used for four years, the formula being similar to that advocated by Dr. Scott. Just why any plater or manufacturer should pay high prices for their cleaning agents is beyond me. If the plater understood chemistry, he would understand his cleaning problem. The trouble is that few of the platers understand chemistry and naturally the manufacturer looks to his platers for suggestions. The result is that the plater or purchasing agent falls a victim to a smooth tongued salesman.

If the cleaner does not meet expectations, the plater is confidentially advised to add some cyanide and use vienna lime in conjunction with the cleaning. If the cleaner stains or still fails to produce satisfactory results, it's the plater's fault and a new one must be made up. The plater is also prevailed upon to impress upon his employer the wonderful merits of the magic salts so that the much desired testimonial may be obtained. The individual contributing the testimonial probably could not make a comparative test of the merits of the article he is advocating.

The writer knows of a case where a certain cleaner was put in on trial, and after a period of several weeks trial the salesman was informed that his cleaner was no good. Upon investigation it was found that the plater was prejudiced and did not even open the barrel since it had been received by him. The fact does not dawn upon the average plater that he can make a most excellent cleaner for a few cents a pound instead of paying fancy royalties to salesmen and commission men.

That an alkali of either sodium or potassium is necessary, either in the hydroxide or carbonate state, is well understood. That these salts need the addition of certain agents to assist the oils and greases to emulsify or saponify, as the case may be, is made capital of by the various manufacturers of cleaning agents, and it is for these addition agents that they charge exorbitant prices. Some of these addition agents may be considered as so much worthless material, as they take no part in the cleaning. While on the other hand the proper material may be purchased for a few cents a pound.

A point generally impressed upon the plater by the manufacturer of certain cleaning agents is that the plater can wash his hands in the cleaner without hurting them. Why should a plater want to wash his hands in a cleaner in the first place? And in the second, if the material contains such alkalies as sodium borate, tri-sodium phosphate or some equally weak alkali, how does he expect to clean his work that may contain cutting and lubricating oils and greases? In other words, the manufacturer is paying fancy prices for the mysterious substance added to an alkali salt and which can be purchased for a small sum if his plater had the knowledge.

Who is to blame for this condition? Is it the plater who considers that he does not need a knowledge of chemistry since his employer does not request it and does not pay for such knowledge, or is it the manufacturer who does not employ a man with a technical knowledge because he does not consider him necessary? As he must have quantity and not quality, standardization means nothing to him, simplicity and uniform results mean nothing; he figures that he can obtain as good a production with an untrained man as to have a trained capable individual at the head of his department. Again, how many manufacturers encourage their foremen platers to attain a knowledge of chemistry or supply those with a technical knowledge, the necessary apparatus to maintain uniform results?

If chemistry could be administered with a spoon, it would be a simple matter for the plater to assimilate some of the principles of the profession. Some of the branches of the American Electro-Platers' Society are maintaining chemical laboratories, with a view of giving those who are interested some understanding of the principles of electro-chemistry and the process of conducting certain determinations, and it is upon the reading of such articles as Dr. Scott's, Dr. Watt's and many more of our scientific friends that the average plater and manufacturer must depend unless the manufacturers place men with both a practical and theoretical knowledge at the head of their departments. Then, and not until then, will there be efficiency in the plating business and the mysterious addition agents disappear from our markets.

William Voss.

New York, October 1, 1917.

# SHOP PROBLEMS

IN THIS DEPARTMENT WE ANSWER QUESTIONS RELATING TO SHOP PRACTICE

ASSOCIATE EDITORS: JESSE L. JONES, Metallurgical PETER W. BLAIR, Mechanical CHARLES H. PROCTOR Plating-Chemical

## CASTING

Q.—We are attempting to make a casting about 11 inches high by 3 inches in diameter in a slush mold consisting of two main sections. We are using five parts of lead to one of antimony and are having difficulty in getting the proper temperature of the mold as well as the metal. We would also appreciate some information as to the method of locking molds of this character and whether they are completely filled with metal or just partly filled and rolled to make a thin casting.

A.—In slush mold casting the molds should always be some degrees cooler than the metal, for if that was not the case the metal would run out of the mold instead of chilling and giving a casting true to the outline of the mold. The molds must be filled up with the metal and then slowly poured out. The gate, where the metal is poured into the mold, must always be kept cooler than the metal. It takes quite a little experience to run a perfect slush mold casting.

The mold must also have a facing as in casting brass, and for this purpose mix jewelers' oxide of iron in fine powdered form with alcohol and heat the mold to 300 degrees and apply the mixture with a soft brush. Apply thinly and evenly so as not to fill up the details in the molds. The best mixture for slush castings consists of 86 parts of lead and 14 parts of antimony. To hold the molds together while pouring the metal use screw clamps such as are employed by carpenters.—C. H. P. Problem 2,491.

## COLORING

Q.—We have some lead discs which we desire to color a tint distinctive from lead. We would prefer a black, if possible, but require something more durable than a painted surface. Can you give us any information on this subject?

A.—A dark coating can probably be produced on lead by immersing in a solution consisting of the following materials:

| | |
|---|---|
| Water | 1 gallon. |
| Sodium cyanide | 6 ounces. |
| Sodium arsenate | 2 to 4 ounces. |

The temperature of the solution should be maintained at 200 degrees Fahr. To protect the colored surface immerse the article in heated paraffin oil.

A black peroxide of lead could also be produced by electrolysis in a solution consisting of

| | |
|---|---|
| Water | 1 gallon. |
| Caustic soda | 8 ounces. |
| Litharge | 1 to 2 ounces. |

The lead to be coated should be the anode and cathodes of carbon should be used with a voltage of from 3 to 4.—C. H. P. Problem 2,492.

## DEPOSITING

Q.—We are interested in the process of producing galvanoplastic work by the use of metal molds which can be produced very quickly and the metal which can be used over and over again. We would like very much to have your opinion as to the value of this process for making ornamental metal articles.

A.—Deposits of copper which are known as galvanoplastic work are being produced by the aid of fusible metal molds. There are no patents on the method and it is used to a considerable extent. Manifold copper pipes on automobile engines are produced by the aid of fusible metal forming the mold. When the copper is deposited to the requisite thickness the fusible metal is run out, leaving a seamless manifold copper pipe. This method can be used in a similar manner for other purposes. The following is a list of the compositions of fusible alloys together with their melting temperature and which can be used over and over again without deterioration:

| | Melting Point. |
|---|---|
| No. 1 Bismuth 8 parts, lead 5 parts, tin 3 parts | 202 degs. Fahr. |
| No. 2 " 8 " " 6 " " 3 " | 208 " " |
| No. 3 " 8 " " 8 " " 3 " | 226 " " |
| No. 4 " 8 " " 8 " " 4 " | 236 " " |

Nos. 1 and 2 are principally used because the alloy will melt in boiling water at 212 degrees Fahr.—C. H. P. Problem 2,493.

## FINISHING

Q.—How can a background be produced on a zinc name plater or sign that has been previously etched? We do not refer to a black filling, but only to an oxidized or plated black finish.

A.—To produce a black finish upon the zinc the articles should be immersed for a few seconds in a solution composed of the following:

| | | |
|---|---|---|
| Water | 1½ | gallons |
| Acetate of copper | 1 | pound |
| Sal soda | 12 | ounces |
| Carbonate of ammonia | 8 | ounces |

or in a dip composed of

| | | |
|---|---|---|
| Water | 1 | gallon |
| Copper nitrate | 1½ | pounds |

Whichever dip is used the articles should be immersed until the black coating is produced, then they should be removed and washed in cold and boiling water and then either lacquered or a wax coating should be applied to protect the finish.—C. H. P. Problem 2,494.

## MELTING

Q.—What is the proper way to fill a crucible for melting? When should zinc be added? When should lead be added? What is considered sufficient time for melting in oil furnace? We mean by filling, should copper be put in and fire started or should brass also be put in at same time?

A.—The rule that the metallurgist observes when he starts to make the mixture of various metals by melting is to melt them in the order of their melting points, taking those with the highest melting points first.

The proper procedure, then, for making a mixture of copper, spelter and lead would be as follows: Presuming that all new stock is to be used, the requisite amount of copper is placed in a crucible first together with a little charcoal broken to the size of chestnuts. If the charge of copper to be melted can be accommodated in the crucible at one time without wedging or crowding the ingots or pieces so that upon expansion of the heat there will be no danger of cracking the crucible, it is all put in at once, but if there is more than can be conveniently used the balance of the charge is placed across the top of the crucible in order to allow it to get hot.

The blast is then turned on and continued until the copper in the crucible has entirely melted at which time the balance of the charge, whether it has been placed upon the top of the crucible or on top of the furnace, is then added and the whole should be covered with a layer of charcoal.

The blast is then turned off and the charge of spelter, which has been previously allowed to lie on top of the furnace in order to get warm, is gradually and carefully fed in by means of a long-handled pair of tongs into the copper.

After the spelter has been added the mixture is thoroughly stirred by means of a long iron rod with a lump on the end. The blast is then turned on again for a few moments, say five minutes, until the proper pouring temperature has been reached, and this may be ascertained by means of a pyrometer, and the crucible

is then withdrawn from the furnace, unless the furnace happens to be of a tilting type, in which case the lead is added last and just before the metal is poured. A second and thorough stirring takes place after adding the lead.

The metal is carefully skimmed free from dross and remaining particles of charcoal, and is then poured into the required molds. Should it be desired to use scrap brass for remelting together with some new stock, that is, fresh copper and spelter, the crucible may be first filled with scrap brass and the copper added as the scrap melts down. The mixture is then stirred and new spelter required to make up the mixture is added as outlined above for new stock.

With good working conditions the charge of metals required for making ordinary two and one brass in an oil furnace should be melted down in from two to two and a half hours for the first heat and one hour for each succeeding heat.—K. Problem 2,495.

## MIXING

Q.—We would like the best mixtures for Delta metal and also manganese bronze.

A.—Mixtures for Delta metal and manganese bronze consist of the following:

DELTA METAL MIXTURES.

| | | | | | |
|---|---|---|---|---|---|
| Copper | 55.94 | 55.80 | 55.82 | 54.22 | 58.65 |
| Zinc | 41.61 | 40.07 | 41.41 | 42.25 | 38.95 |
| Lead | 0.72 | 1.82 | 0.76 | 1.10 | 0.67 |
| Iron | 0.87 | 1.28 | 0.86 | 0.99 | 1.62 |
| Manganese | 0.81 | 0.96 | 1.38 | 1.09 | .... |
| Nickel | trace | trace | 0.06 | 0.16 | 0.11 |
| Phosphorus | 0.113 | 0.111 | trace | 0.02 | .... |

MANGANESE BRONZE MIXTURES.

| | Castings. | Sheets. |
|---|---|---|
| Copper | 57.30 | 60.17 |
| Zinc | 40.44 | 37.47 |
| Tin | 1.01 | .99 |
| Iron | .79 | 1.24 |
| Lead | .... | trace |
| Aluminum | .46 | .... |
| Manganese | trace | .02 |

—K. Problem 2,496.

## PLATING

Q.—We find that after we silver plate our instruments or gold plate them, the finish looks good from the outside or a surface glance, but when we burnish any part of this plating (which is done by hand) there appears to be oil directly under the surface. This makes it necessary for us to burnish, then clean with soda and then burnish again to obtain a good color.

A.—We do not understand why the burnished silver deposit should show an oily appearance, requiring a cleaning and re-burnishing to bring up a clear color. It might be possible that the soap you are using as a lubricant for the burnishing tools may cause this peculiar tone to the finished product.

In order to find out if such is the case after burnishing color the burnished surface by polishing with a very soft buff wheel, using jewelers' gold rouge in powder form and mixed with denatured alcohol or carbon tetra chloride. Apply the mixture to the buff with a brush, and after buffing and cleansing note whether the oily tone still prevails.—C. H. P. Problem 2,497.

Q.—Please advise how we can silver plate horse bits so they will not rust through.

A.—The most successful method in plating horses' bits to avoid rusting is to tin them in a molten tin bath and afterwards polishing and plating. If you cannot do this then give them a good heavy coat of nickel previous to silver plating. —C. H. P. Problem 2,497a.

## RUSTING

Q.—We have a pressed steel cup of irregular shape to which we desire to fasten a plate of hot rolled steel about 0.85 thick. As this has to stand a severe strain we have found it best to solder these together with a hard solder, using muriatic acid as a cleanser. In doing this we find that unless the work is plated within the following two or three hours it rusts, thereby causing us considerable trouble.

At one time we copper-plated these two articles before soldering, but this is expensive and with the grade of steel we use is not satisfactory on account of the copper not holding to the steel because of scale and grease on the steel. At present we are dipping this work in a sal soda solution, but do not find that this is absolutely satisfactory.

A.—It seems as though a thorough immersion in a hot sal soda solution should neutralize any free acid remaining in the pores of the steel from the pickling operation. The steel wire manufacturers make use of a milk of lime solution, in other words slacked lime mixed with boiling water to a fluid paste. This method would answer your purpose providing the thin coating of lime would not prove objectionable upon the steel surface.

The method you are using could be supplemented with an immersion in a boiling solution of platers' compound. This immersion following the sal soda would act as a further preventive of rusting. The proportions of the solution would be as follows:

Water .....1 gallon.
Platers' compound.....2 to 4 ounces.
Temperature 200 degrees Fahr.—C. H. P. Problem 2,498.

## TUMBLING

Q.—I am having trouble in tumbling with soap. The articles and shot used in the barrel get coated with a gray substance. Can you advise what is the cause and a remedy for same? Also would like a formula for a dry tumbling process.

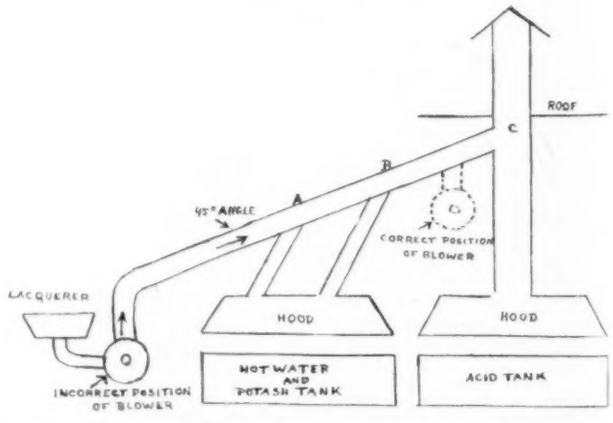
A.—The trouble must be due to the nature of soap you are using. Perhaps also the water is hard and may leave a coating on the articles. We would suggest that you use soap chips and use just a little soda ash of borax as a lubricant or, in other words, to soften the water, about ¼ to ½ ounce per gallon of water will be ample.

In dry tumbling all that is necessary is to be sure that the work is clean and dry and the burnishing balls bright. Do not use the soap and water. A little macerated leather and Vienna lime mixed with benzine would aid in polishing in connection with the steel balls.—C. H. P. Problem 2,499.

## VENTILATING

Q.—What, in your opinion, is the trouble with piping of the exhaust system as per sketch? The trouble that we are having is a back draft in each of the flues instead of a forced draft. The idea being for the exhaust from the lacquering blower to cause a forced draft and take off the fumes and steam from tanks and vats.

A.—To enable the fumes to be carried out by suction as outlined in the sketch, the fan or exhaust would have to be placed in the end of the exhaust pipe near the outlet pipe, as shown in the sketch. Under the present methods the fumes are forced back, due to the apertures being on the wrong side of the blower.—The blower is practically of no use in the present position.—C. H. P. Problem 2,500.

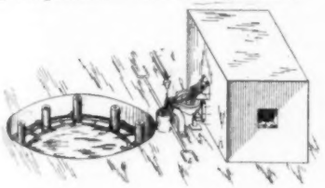



SKETCH SHOWING INCORRECT AND CORRECT POSITION OF A BLOWER FOR VENTILATING A SHOP.

# PATENTS

A REVIEW OF CURRENT PATENTS OF INTEREST

1,235,872. August 7, 1917. **Process of Alloying Metals.** Chauncey C. Baldwin, of Perth Amboy, N. J., assignor to Standard Underground Cable Company, of Pittsburgh, Pa., a corporation of Pennsylvania.



The object of this invention is to furnish an improved method of making metallic alloys in which one of the metallic ingredients is of a volatile character when heated to the temperature of the more refractory ingredients, and is thus liable to great loss by volatilization if melted simultaneously therewith.

To avoid such loss in the making of copper alloys, it has been proposed to place the zinc or tin in a solid state in a receptacle and to draw molten copper from the tap-hole of a melting furnace directly into the said receptacle upon the solid ingredient; but the tap-hole of such a furnace is not adapted to discharge the melted metal under such control nor in such regulated quantities as would be needed to make, with a given weight of zinc, an alloy of specific proportions.

The inventor therefore in the present invention interposes a tilting ladle, as shown in cut, between the melting furnace and the receptacle containing the solid zinc or tin, with the tilting ladle mounted below the tap-hole, and which ladle may be tilted by hand and the flow of metal therefrom exactly controlled. The said tilting ladle may receive charges of irregular quantities from the tap-hole of the furnace, but supply exactly the desired amount to the receptacle containing the solid zinc or tin.

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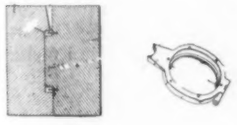
1,238,789. September 4, 1917. **Method or Art of Making Commercial Castings.** John Kralund, of Brooklyn, N. Y., assignor to Doehler Die Casting Company, a corporation of New York.

This invention relates to a method or art of making commercial castings and more particularly to such a method which is especially adapted for the production of castings of large bulk, requiring no machining after completion to bring them to size, or give the desired finish thereto.



The primary object of the invention is to produce such castings under conditions whereby the mold or die, as shown in cut, will not be injuriously affected by the shrinkage, or by the high temperatures of the metal. A further advantage of the method or art of the invention is that in the production of patterns of a material, the fusing point of which is very much lower than the fusing point of any metal suitable for use in machine parts, this material may be selected with the view of avoiding those high temperatures and that shrinkage which is injurious to the die and to the finished product.

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1,238,183. August 28, 1917. **Method or Art of Making Molds.** Leo Frank Nock, of Brooklyn, N. Y., assignor to Doehler Die Casting Company, of Brooklyn, N. Y., a corporation of New York.

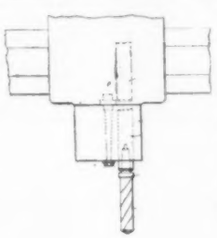
This invention relates to the method or art of making molds and more particularly to the making of molds of plastic material to be used in making metal castings of mechanical parts wherein it is not only necessary to preserve accuracy in the contour and smoothness of finish of the castings, but exactitude in the dimensions thereof.

The invention consists primarily in the method or art of making molds consisting in embedding a pattern formed of wax in plastic material, saturating said mold after the material thereof has set, with a fluid medium, repellant to wax and at a temperature which will melt said wax whereby said pattern will be reduced to a fluid state and the absorption of the fluid wax by the material of the mold will be prevented, flowing said fluid wax through an opening in the mold and finally drying the mold.

---

1,238,929. September 4, 1917. **Attachment for Metal Working Machines.** Paul Müller, Berlin, Germany.

This invention relates to improvements in boring, drilling and similar metal working machines and in particular to the tool holder of such machines. The object of the invention is to provide a device adapted to hold a plurality of tools which are successively brought into operative position as required by the particular work to be performed. A main feature of the invention resides in that the connection of the driving spindle with the successive tools is automatically effected within the said device.



The invention consists essentially of a rotatable turret-head, as shown in cut, having a plurality of vertical bores for the insertion of the tools, and adapted to successively bring said tools in line with the driving spindle for the purpose of operatively connecting the latter with the respective tool.

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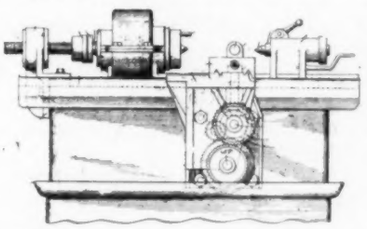
1,238,935. September 4, 1917. **Lathe.** Carl G. Olson, of Chicago, Ill., assignor to Illinois Tool Works, of Chicago, Ill., a corporation of Illinois.

This invention relates to lathes in which the head stock with its main spindle and the tail stock are mounted on a main carriage and travel past the tool. In this machine, the tool is mounted on a cross-carriage which moves transversely to the axis of rotation of the main spindle. The object of the invention is to provide a lathe of this general character and to carry out the design in an efficient and practical manner.

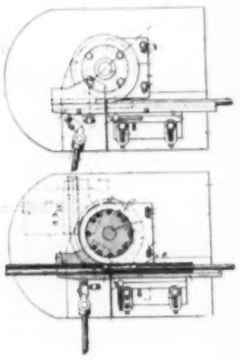


The patent covers:

A machine tool having an elongated frame, as shown in cut, an elongated carriage guided upon and extending from end to end of said frame, said carriage being bifurcated approximately centrally at one end, a standard fastened to the machine frame and passing up through the bifurcation in the carriage, a lead screw working in said nut, a spindle rigidly fastened to said lead nut at the upper end of said standard, a lead screw working in said nut, a spindle rigidly fastened to said lead screw in line therewith, a work holder fastened to said spindle, actuating means partly on the main frame and partly on the carriage for rotating said spindle and thus also causing the carriage to travel, a cross-carriage for carrying the tool, an eccentric for operating said cross-carriage, and means operating in timed relation with the rotating spindle for rotating said eccentric to move the cross-carriage toward and from the axis of the work.

1,238,941. September 4, 1917. **Tube Bending Mechanism.** Augustus James Reynders, of Butler, Pa., assignor to Pittsburgh-Hickson Company, of Butler, Pa.

In the bending of tubing utilized in the production of metal bedsteads and other articles of furniture, hand rails, etc., it has heretofore been extremely difficult if not almost impossible to prevent the metal at the inner or concave side of the bend from crimping or developing other surface irregularities due to the compression of that portion of the metal and the corresponding stretching the convex side of the bend. The prevention of surface blemishes of this kind is greatly to be desired, particularly when the product is to be highly polished, imperfections being more apparent therein than, for instance, with unfinished steel tubing the surface of which is subsequently painted.



The object of this invention is to provide mechanism of novel construction, as shown in cut, by which the bending of tubing of all kinds is accomplished without developing crimps or other imperfections in any portion of the tubing, the inner or concave side of the bend being quite as smooth and free from blemish as the outer or convex side.

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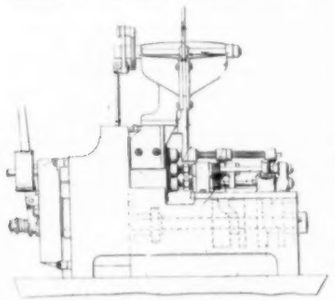
1,239,053. September 4, 1917. **Metal Working Machine.** Roy H. Smith, Cleveland, Ohio.

This invention relates to metal working machines, and particularly to automatic machines for drilling and facing or otherwise operating an irregular or polygonal blanks, such as square or hexagonal nut blanks.



The main object of the invention is to provide a machine wherein the different operations are performed on blanks, such as of the type specified, more rapidly, more satisfactorily and less expensively than with prior machines.

Further and more specific objects are to provide a construction, as shown in cut, wherein substantially the same cutting speed is obtained in drilling and facing a nut blank without requiring a rotary facing tool, and to provide means for inserting a polygonal blank in a rotating chuck or holder.

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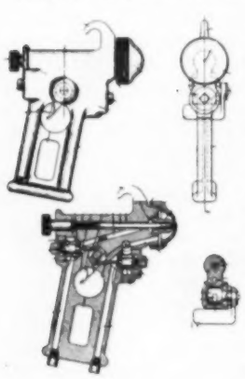
1,239,089. September 4, 1917. **Process of Applying Coating Material.** Herbert W. Day, of Wollaston, Mass., assignor to Spray Engineering Company, of Boston, Mass.

This invention relates to a process, as shown in cut, for applying coating material to surfaces. The coating, if a liquid, may be a paint, japan, varnish, or other suitable coating medium, or it may be a solid in powdered form, and the material to which it is to be applied may be of any character, such, for example, as wood, metal or other material.



An important object of the invention is to effect by the described process the formation of a film maintained by capillary action and broken and projected by fluid under pressure.

The investor claims:

That method of applying coating which comprises directing a fluid current and conducting by capillarity a film of the coating material into a position substantially transverse to the path of said fluid current, whereby the film is broken and discharged upon the work.

That method of applying coating which comprises directing a fluid current and conducting by capillarity a film of the coating material into a position substantially transverse to the path of said fluid current, and constantly renewing and maintaining a film by capillarity in such position whereby the film is constantly broken and discharged upon the work.

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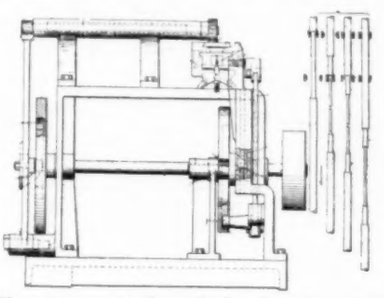
1,239,451. September 11, 1917. **Process and Means for Making Drawn Wire Articles.** Louis C. Belz, Philadelphia, Pa.

The object of this invention is to provide a method and means, as shown in cut, for making a wire article having a portion of its length, intermediate of its ends, reduced in diameter, thereby providing a wire body with end portions of materially greater diameter and strength. Wire articles of this character may be made in various lengths and diameters, and the relative lengths of the portions of different diameters may be more or less varied; and may be utilized for the manufacture of tripronged hair pins, such as set out in Letters Patent No. 1,026,142, granted May 14,1912, and for other purposes, wheel spokes, for example. These specially formed wires may be used for many purposes where tension is necessary, and they provide heavy ends suitable for receiving screw threads or of being upset or riveted, and they may also be used for tools, by proper subdivision and shaping.



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1,239,785. September 11, 1917. **Soldering Compound.** George Gardiner, East Cleveland, Ohio.

This invention relates to soldering compounds, and has for its object to provide a compound particularly adapted and intended for soldering aluminum, although it is capable of use for soldering other metals, or for soldering aluminum to other metals.

In making the compound, for example, one pound of zinc is placed in a metal ladle and heated, and to this is added two ounces of spermaceti, and when the zinc becomes molten impurities will rise to the surface in the form of a scum which is removed. Then two pounds of tin are added, and this is permitted to melt in the ladle, and after it becomes molten a scum rises which is removed. Then eight ounces of pure Babbitt metal—composed of tin, zinc, copper and antimony in the following proportions by weight: tin, 37.4375 parts, zinc 18.435 parts, copper .125 part and antimony .0025 part—are added and melted, and the mixture is stirred vigorously and finally poured into an iron or stone mold to cool and harden, and it is then ready for use.

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1,239,854. September 11, 1917. **Composition of Matter for the Welding and Soldering of Articles Constructed of Aluminum.** Clarence Charles Wells, of Fort Worth, Texas.

My composition consists of the following ingredients, combined in the proportions stated, viz:

| | |
|---|---|
| Aluminum | 1 part. |
| Lead | 3 parts. |
| Block tin | 7 parts. |
| Zinc | 2 parts. |

These ingredients are subjected to heat until in a molten state at which time they are thoroughly mingled by agitation; they requiring a heat of seven to eight hundred degrees Fahrenheit to cause them to become in such a molten state as to mingle freely, and become one molten mass. The different ingredients after being melted and thoroughly mingled by agitation and while still in the molten form is treated four to seven times with muriatic acid of strength thirty-two per cent. pure, the acid being poured into the composition to purify and cleanse the same; the acid after evaporation leaves the sediment and dirt in the composition floating on the surface, which sediment and dirt is skimmed from the surface leaving the composition pure and clean and ready to be poured into forms or molds suitable to the manufacturer.

# EQUIPMENT

NEW AND USEFUL DEVICES, MACHINERY AND SUPPLIES OF INTEREST

## NEW CHICAGO CRUCIBLE COMPANY

The crucible plant shown in the pictures has been designed, erected and is now being operated by Jonathan Bartley, the well-known authority on crucible manufacture for the New Chicago Crucible Company of Chicago, Ill. Mr. Bartley has prepared a story outlining the conditions in the crucible industry in the United States and also telling why the company has gone into the business. What Mr. Bartley has to say is summed up as follows:

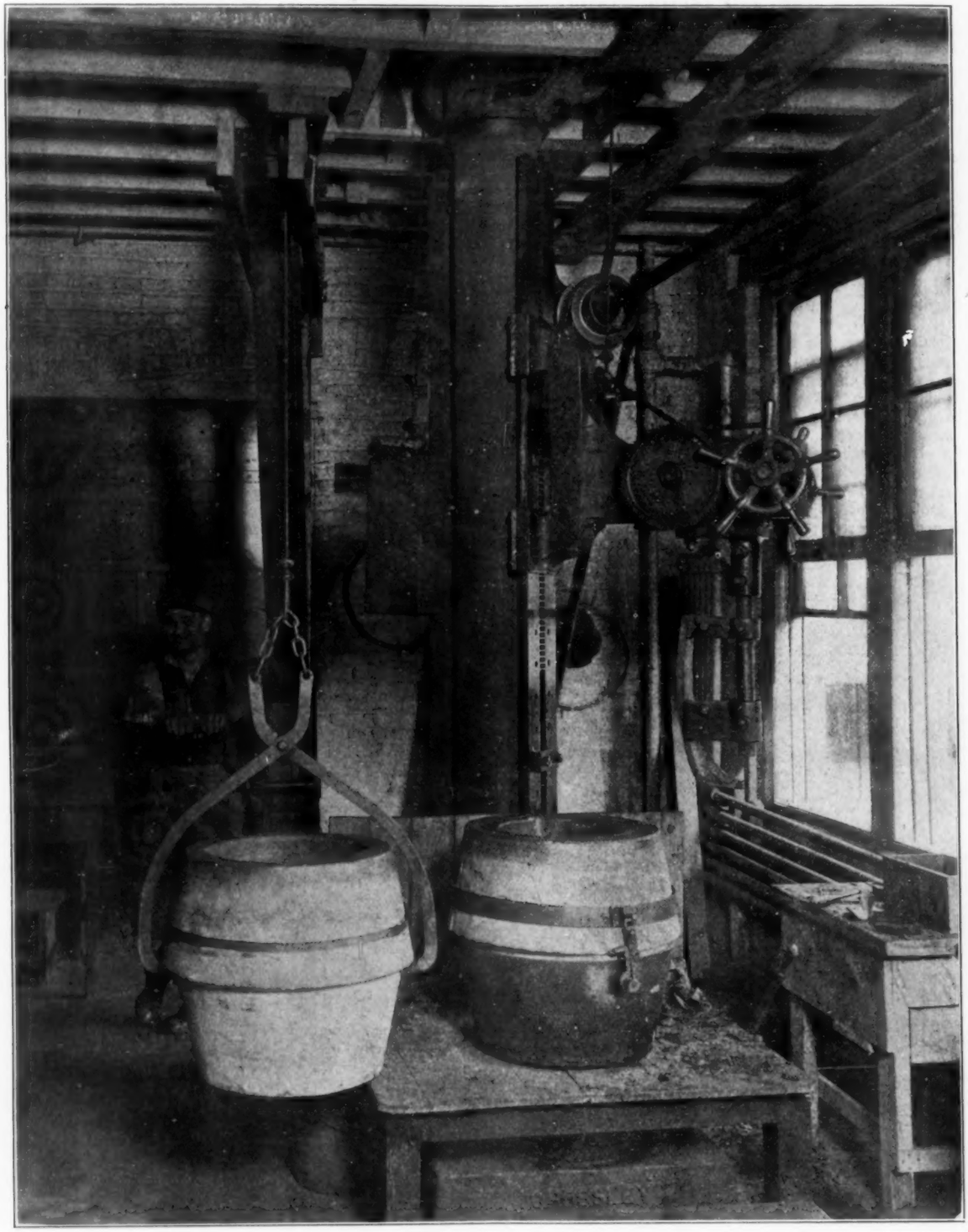
"Particular interest is attached to many new American industries that have been created by and through war conditions. Equally interesting are the developments that have arisen among the old industries who have always depended on foreign countries for certain raw materials in the manufacture of their products which by reason of the war have been cut off, making it necessary to look for something of home production in order to produce their goods. We know of no industry more affected by these conditions than the crucible business.

JONATHAN BARTLEY, General Manager.

"From the time of the first making of graphite crucibles in the United States every maker has depended on graphite coming from the Island of Ceylon and the clay from Germany. Experiments were made now and then with domestic products, but never in an exhaustive manner. It was only when the war cut off from us these supplies that the crucible maker woke up to realize that it was 'a condition that confronted him.' The first crash came early in August, 1912, when the British Government placed an embargo on Ceylon graphite. Some of the makers were fairly well supplied, many of them empty handed. Crucibles were necessary to carry on the making of war munitions, and for a while anything that could be twisted into spelling graphite was brought forward, with the result that the foundryman realized that there was something 'confronting' him. A

FINISHING AND GREEN DRYING ROOM AT THE PLANT OF THE NEW CHICAGO CRUCIBLE COMPANY, CHICAGO, ILL.
(MANAGER JONATHAN BARTLEY IS STANDING IN THE LEFT FOREGROUND.)

strong effort on the part of the makers succeeded in having the embargo lifted for a time, with freight and insurance rates soaring daily. After a time another embargo was placed and a second successful effort was made to lift it. There was, however, another and equally serious situation looking them in the face. Their supply of German clay was becoming exhausted.



"JIGGER" MACHINE AT THE PLANT OF THE NEW CHICAGO CRUCIBLE COMPANY, CHICAGO, ILL.

"The principal components in a graphite crucible are graphite and clay. With the supply of both practically cut off, and little or no knowledge of a substitute, the crucible maker was like a mariner at sea without a compass. The German clay on which the crucible maker had always depended came from the town of Klingenberg. It carried with it a certain quality that has never been found in our domestic clays. From an analytical point of view many of our domestic clays run almost precisely with the German, but there seems to be a certain element in the German product that nature left out of the domestic. It has been our contention and our results have proven that the 'blending' of certain domestic clays will have the effect of producing as good

results with our home product as that obtained from the foreign. Plainly speaking, our crucible maker was 'unprepared,' and this bespeaks the condition of the great majority of American manufacturers and throws a ray of light for the future as the result of the war.

"The foregoing is in a measure an explanation to the foundryman why his crucibles were so 'rotten' two years ago, and the reason he is getting better results today. It is true they are not back to their standard, but with the efforts being made, not only with and among the makers themselves, but with the United States Government, in the interest of procuring domestic products suitable for our work, we feel safe in predicting an even higher standard than that before the war. Professors A. V. Bleininger and C. A. Loomis, of the Bureau of Standards, of

A POTTERY KILN USED FOR BURNING GRAPHITE CRUCIBLES AT THE PLANT OF THE NEW CHICAGO CRUCIBLE COMPANY, CHICAGO, ILL. THE CAPACITY OF THIS KILN IS 130,000 "NUMBERS" AS AGAINST 90,000 "NUMBERS" OF THE LARGEST CRUCIBLE KILNS.

Pittsburg, write that 'Considerable activity has prevailed during the last two years in the searching for domestic refractory clays possessing sufficient plasticity, bonding power and strength to be used in the manufacture of graphite crucibles.' The Clay Products section of the Bureau of Standards during the last two years has come in possession of a number of clay samples that when blended give an excellent substitute for the German. We ourselves are carrying along a series of experiments which have proved highly successful, but in connection with this, there is another explanation due the foundryman, and that is the reason for the excessive cost of graphite crucibles today.

"Before the war the crucible maker purchased a high grade of graphite for less than one-third the price that is now being paid for the same grade. German clay had a standard price per ton. The crucible maker is now paying nearly four times that price for it. Added to this is the advanced cost of labor. These facts alone are sufficient to show the cause for the increase of cost in crucibles, and when the matter of capital required to conduct and operate an up-to-date crucible plant is taken into consideration, the sudden changes in advanced prices, and the uncertainty of deliveries in graphite, etc., are computed, it does not require the service of a great mathematician to place the profits in the crucible business anywhere above normal.

"Our reason for entering the field can be stated plainly in the fact that we are located in the middle west, where no crucible plants exist. The foundry trade has been gradually drifting westward and we feel that the field is sufficiently large to encourage us to engage in this business."

A number of crucibles made in the factory shown in the photographs were shown in Boston at the exhibition of foundry supplies, held September 24 to 28, and reflected great credit on Mr. Bartley for his enthusiasm and energy in getting the plant built and operated. The president of the company is Dr. Sherman Taylor and the address 2525 Clybourn avenue, Chicago, Ill.

THE PLANT OF THE NEW CHICAGO CRUCIBLE COMPANY, CHICAGO, ILL.

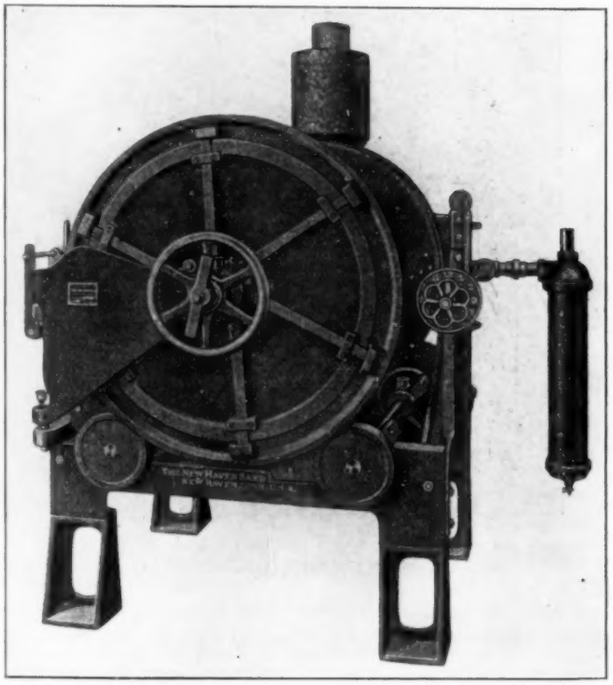
## SAND BLAST BARREL

While the self-contained sand-blast barrel exhibited at the Boston convention by the New Haven Sand Blast Company, New Haven, Conn., was not claimed to be an absolutely new product of the company, yet it was stated it had numerous improvements over former barrels shown and that it now represents a standard type.

While we have described this barrel several times in THE METAL INDUSTRY, it may be of interest to go over once more a few of the details and mention one or two of the advantages claimed by the manufacturers for this particular barrel. All cleaning abrasives never leave the barrel, and to this fact is attributed the reputation of the New Haven barrel for the low cost of maintenance. It is stated that no other sand-blast barrel confines the sand inside, and consequently there is no danger of its coming in contact with roller gears and bearings which would, of course, have disastrous results. Owing to the construction, the manufacturers state that they are able to use four nozzles in one barrel, which means that the work is sand blasted quicker and more thoroughly than by other methods.

A special feature regarding this barrel, which should be of particular interest to prospective users of such apparatus, is the cost of installation. No special foundation is necessary. Base legs are furnished with each machine, elevating it to a height convenient for the operator to handle and allowing the placing of wheelbarrow or truck at front of barrel where the castings may easily be emptied into it and taken away.

For convenience, where barrels are using grit or shot, it is recommended the barrel being placed on concrete or good wooden flooring where any grit falling from barrel while removing castings may be swept up and returned to barrel. Where air pressure and exhaust are already installed, it is only necessary to connect belt, and pipes from each system to barrel, and it is ready for operation.

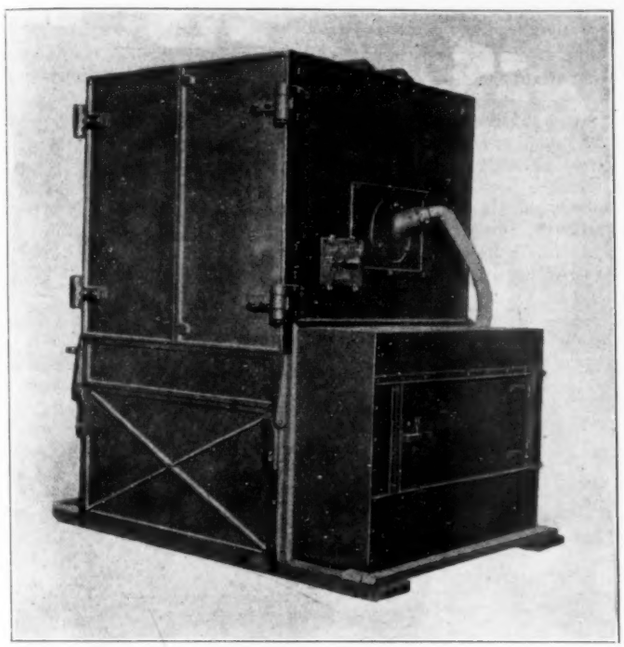


SELF CONTAINED SAND BLAST BARREL. NEW HAVEN SAND BLAST COMPANY, NEW HAVEN, CONN.

## SAND BLAST MACHINE

One of the most extensive exhibits of sand-blast equipment shown at the Boston Convention was that of the American Foundry Equipment Company, New York, N. Y. This exhibit included a full line of American-Wadsworth automatic sand-blast tumbling barrels, rotary table sand-blast rooms and automatic sand-blast cabinets.

As was explained by the demonstrator at the booth of this company, all American-Wadsworth sand-blast apparatus is designed on the pressure principle; that is, sand is contained in the tank under pressure. They stated that the pressure system is known to consume thirty to fifty per cent. less air for equal results than the commonly used suction system of sand-blast operation. As compressed air at ordinary foundry pressures cost .3 or .4 of a cent per hundred cubic feet to produce, the air economy of the pressure system amounts to an appreciable money saving every day even in a small installation.



AMERICAN-WADSWORTH AUTOMATIC SAND BLAST TUMBLING BARREL.

The American-Wadsworth system is also self-contained, say the makers, and there is no elevating of sand necessary, thus eliminating the usual bucket elevators, suction pipes and overheads and hoppers. This also represents a considerable saving in cost and maintenance, as well as eliminating all dangerously exposed moving parts.

AUTOMATIC FILLING VALVE.

The sand in this system is contained in a steel tank, located in a pit beneath the blast portion of the machine. While blasting, the sand flows continually from the tank through a trap in the bottom, where it is caught by the compressed air line and driven under pressure to the working point. By means of an auxiliary air line the tank is placed under pressure, and the sand flow controlled. The secret of the success of the American-Wadsworth sand-blast machine is said to lie in the automatic filling valve, which is contained in the accompanying cut. It is the ingenious feature that does away with sand elevating and supporting mechanism, and makes it the only strictly self-contained sand-blast apparatus. Open, it admits the spent sand from the collecting hopper to the tank. Its operation is entirely automatic. When the blast is off, it stands open; when blasting is resumed an air cylinder automatically closes the valve. There is no sand erosion at this valve, as the sand merely drops through it—not under pressure.

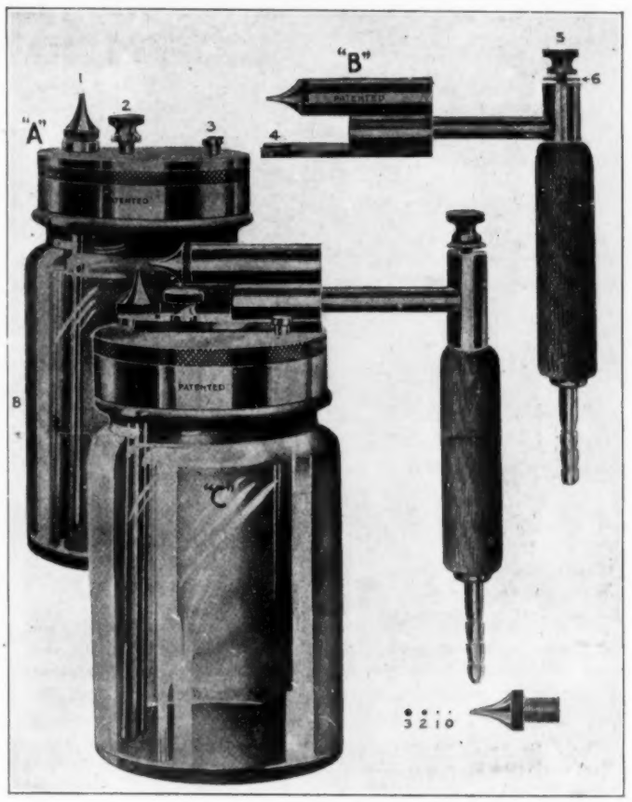
Another feature which considerably adds to the efficiency of this machine is the automatic release valve through which, on discontinuance of blasting, all air is instantly discharged from over the sand in the tank. The release of this air is a safety measure to avoid its expansion and consequent forcing the sand into the blast lines, thereby clogging them and making it difficult to restart the machine. It also saves the time that would be required to exhaust this air through the nozzles when stopping the blast.

Further information relating to this interesting exhibit is to be found in the neat catalog issued by the American Foundry Equipment Company, 52 Vanderbilt avenue, New York, from whom copies may be had upon request.

## AIR BRUSH

A new air brush for use in spraying materials, such as lacquers, enamels, bronzing liquid, paints and varnishes, has just been put upon the market under the name of the Crown air brush by the B. E. Holton Company, of Los Angeles, Cal. The air brush, as shown in the cut, is said to have superior advantages in its ability to save the operator time and expense. These advantages are pointed out by the manufacturers in the following manner:

Air chamber "B" is adjustable to cover "A" by simply placing plate 4 through guides 3 and fastening same with thumb screw 2. Hence with this arrangement and by securing as many extra covers "A" as materials to be used, it is only necessary to transfer air chamber "B" with air connection attached from one jar to the other containing the different materials, thereby saving time and expense in cleaning, as is necessary with other air brushes now on the market, which have air chamber permanently attached to the cover, and while this may appear to be a very small item to the prospective purchaser, it proves an



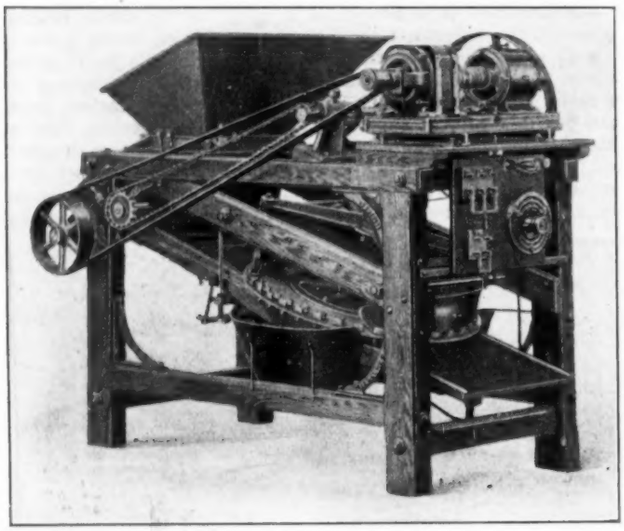

THE CROWN AIR BRUSH.

important factor in the year's expense. By raising or lowering nozzle 1, as shown on cover "A," the flow of material may be widened or concentrated at the desire of the user. Air chamber "B" may be used as an air duster. The brush is fitted with stipple attachment 6, as shown. Same may be raised or lowered as desired, thereby permitting of a fine or coarse stipple. When not in use stipple attachment should be screwed tightly against thumb press 5. Cover "A" fits the ordinary Mason fruit jar.

## MAGNETIC SEPARATORS

The magnetic separator shown in the cut represents the disk type of separator and was exhibited at the Boston Convention by the Dings Magnetic Separator Company, of Milwaukee, Wis. This type of separator is claimed to be the best for removing iron from brass and copper turnings, borings, punchings, washings, skimmings, fine scrap, etc., and with the new form of magnets and conveyor supports is now better than ever.

The magnets consist of a large stationary primary magnet body and a series of small secondary induced magnets mounted upon a rotatory disk. The primary magnet is held solidly in a fixed position and has heavy double coils and cores with pole pieces projecting downward and conforming to the circle of the disk. The secondary magnets which are made of the best Swedish iron are inductively energized by the primary magnets when over the conveyor, but become demagnetized as they leave the proximity of the primary poles and automatically discharge any iron or magnetic material they may have attracted, allowing it to drop at the points on the sides where the disk overhangs the conveyor, and is conveyed by chutes into a box or receptacle on the floor



DINGS MAGNETIC SEPARATOR—DISK TYPE.

beneath. The non-magnetic metal passes off at the end of the conveyor to final delivery.

The manufacturers call attention to the following important features:

The stock in passing over the conveyor is brought under a powerful magnetic field at two different points, which is equal to two separate treatments with an ordinary separator.

As the iron is picked up without the magnets coming into direct contact with the mixed metals, but slight chance is offered for mechanical entanglement, and for this reason it makes an excellent separator for handling material containing a heavy burden of iron, or for recovering brass from iron turnings.

The electricity is conducted directly to stationary magnet coils and the secondary magnets discharge the iron and magnetic material automatically. There is no commutator, circuit breaker, cut-out device, or sliding electrical contacts to spark, flash and cause trouble, and no expensive revolving brush, scraper or knock-off to wear out.

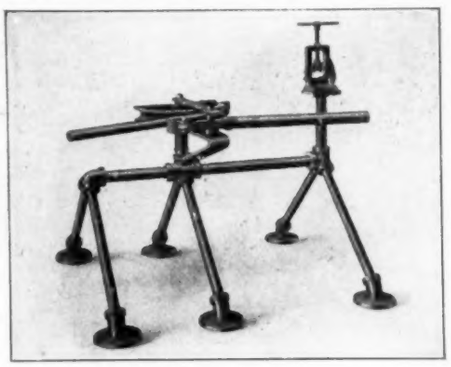
Every electrical connection and mechanical part is accessible for inspection without taking the machine apart. The electrical parts are substantially and carefully insulated and protected, and with reasonable care there can be no question about durability and continued efficiency.

An exclusive and very valuable feature is found in the adaptability of this separator to operate on two different voltages. The magnet coils are so arranged that by simply changing the terminal connections, the machine can be operated on a different voltage of electricty without affecting the magnetic intensity or the efficiency of the separator. For example, if a separator is built to operate on 110 volts it can be readily changed to operate on 220 volts, or vice versa, without rewinding the coils or changing the watt consumption of the energizing current. Complete information concerning these separators is to be found in the new catalogue of the company.

## PIPE BENDING MACHINE

One of the non-moving exhibits which particularly attracted as much attention as some of the more spectacular and gigantic exhibits at the Boston convention was the Wonder pipe bender, which is here shown by means of the several cuts. This machine bends all sizes of pipe generally used, to any required degree, with the utmost ease, and furthermore bends pipe cold without any filling or treating of any kind.

It is stated that the pipe bender is so economical that the small-



MODEL A.

est shop can afford to have one, and with such a machine non-skilled workmen can bend a two-inch pipe to a ninety degree angle in about one minute. The pipe bender is built in three sizes for bending pipe of every diameter, from one-eighth inch to four inches. The equipment of the several models is as follows: Model S is equipped with six heads, from one-eighth inch to one inch; weight of machine, 75 pounds. Model A is equipped with seven different heads, taking sizes from three-

MODEL S JUNIOR WITH SIX HEADS.

eighth inch to two inches; weight of machine, 550 pounds. Model B is equipped with four heads, from two and one-half inches to four inches; weight of machine, 1,500 pounds. The Model A and B machines are equipped with a pipe vise, bolted rigidly to the frame of the machine. This does away with the old wooden vise bench and vise, so that in this one machine or tool is all the necessary pipe-working apparatus.

These machines are manufactured by the American Pipe Bending Machine Company, of 39 Pearl street, Boston, Mass.

# ASSOCIATIONS AND SOCIETIES

REPORTS OF THE CURRENT PROCEEDINGS OF THE VARIOUS ORGANIZATIONS

## NATIONAL CHEMICAL EXPOSITION

The National Exposition of Chemical Industries, held at Grand Central Palace, New York, September 24 to 29, in connection with the convention of the American Chemical Society, proved to be a decided success. The exhibition occupied three floors and there were about 350 exhibitors. The attendance also proved to be very large.

Among the concerns exhibiting their products, which are of interest to METAL INDUSTRY readers, were:

Abbe Engineering Company, New York—Beach-Russ blowers and vacuum pumps.

Paul O. Abbe, New York—Crushing and pulverizing machines.

Armstrong Cork & Insulation Company, Pittsburgh, Pa.—Insulating brick.

J. T. Baker Chemical Company, Phillipsburg, N. J.—C. P. Chemicals.

Bausch & Lomb Optical Company, New York—Pyrometers.

Bayonne Casting Company, Bayonne, N. J.—Monel metal.

The Bristol Company, Waterbury, Conn.—Pyrometers, etc.

Butterworth-Judson Corporation, New York—Acids and other chemicals.

The Carborundum Company, Niagara Falls, N. Y.—Abrasives.

Celluloid Zapon Company, New York—Zapon lacquers, etc.

Denver Fire Clay Company, Denver, Colo.—Tilting Crucible Furnace, etc.

Du Pont Chemical Works, New York—Lacquers, etc.

Electrolytic Zinc Company, New York—Producers of spelter.

General Bakelite Company, New York—Lacquers, etc.

General Chemical Company, New York—Phosphorus and other chemicals.

General Electric Company, Schenectady, N. Y.—Electrical equipment.

Hardinge-Conical Mill Company, New York—Crushers and pulverizers for brass foundry wastes, etc.

Hoskins Manufacturing Company, Detroit, Mich.—Pyrometers.

Janney-Steinmetz & Company, Philadelphia, Pa.—Metals.

Kalbfleisch Corporation, New York—Chemicals and lacquers.

Klipstein, A., & Company, New York—Chemicals.

Metals Disintegrating Company, New York—Lead, tin, zinc and aluminum dust.

Mogul Company, New York—Acid Proof material.

Norton Company, New York—Abrasives.

Prest-O-Lite Company, Indianapolis, Ind.—Welding apparatus.

Quigley Furnace Specialties Company, New York—Hytempite for furnace linings and crucibles.

Solvay Process Company, Syracuse, N. Y.—Alkalis.

Sturtevant Mill Company, Boston, Mass.—Crushers and pulverizers.

Taylor Instrument Company, Rochester, N. Y.—Pyrometers.

Thwing Instrument Company, Philadelphia, Pa.—Pyrometers.

Roessler & Hasslacher Chemical Company, New York—Metal cyanides, Trisalyt and other chemicals.

Tolhurst Machine Works, Troy, N. Y.—Centrifugal dryers for metal goods.

Uehling Instrument Company, New York—Pyrometers.

United Lead Company, New York—Lead-lined pipe and other products.

United Smelting Company, Inc., New York—Copper, spelter, etc.

# PERSONALS

ITEMS OF INDIVIDUAL INTEREST

## DEATHS

JOHN P. BONNETT.

**John P. Bonnett,** of North Attleboro, Mass., died Monday morning, September 3, at his home on Elm street. Mr. Bonnett had been in poor health for several years and had been obliged to undergo many operations, all of which he bore with such courage and patience as to win the admiration of all.

Mr. Bonnett, who was the head of J. P. Bonnett & Company, was one of the best-known electro-platers in the country and his life is a story of what can be accomplished by one who strives. He was born in Waterbury, Conn., in July, 1843. When a lad of nine years he was thrown upon his own resources and was obliged to go out and work. He worked as a helper on presses, and when 17 years old he began learning the electro-plating business, and subsequent to that for five years was foreman of the plating department for the Ames Manufacturing Company at Chicopee, Mass. He later went to Newark, and from there came to North Attleboro to take charge of the electro-plating department of F. G. Whitney & Company. He remained with that firm for eight years and then associated himself with George W. Cheever, now senior member of Cheever, Tweedy & Company, under the firm name of Cheever & Bonnett, as electro-platers. They manufactured a few goods, but later that branch was continued by Mr. Cheever, and Mr. Bonnett engaged in the electro-plating business for himself.

He is survived by a widow and two children: Frank, of this town, who is associated with the business, and Mrs. Charles Stanley, Newark, N. J.

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**Daniel J. Bechtel** proprietor of the Bechtel Engraving Company, died on September 29 at his home, 480 West State street, Trenton, N. J., from a complication of diseases. He had been ill but a short time. He is survived by a widow and two sons, Garret, a member of the Quartermaster's Corps, Anniston, Ala., and Frederick V., head of the electrical department of the Trenton and Mercer County Traction Company.

## MAJOR HENRY SOUTHER

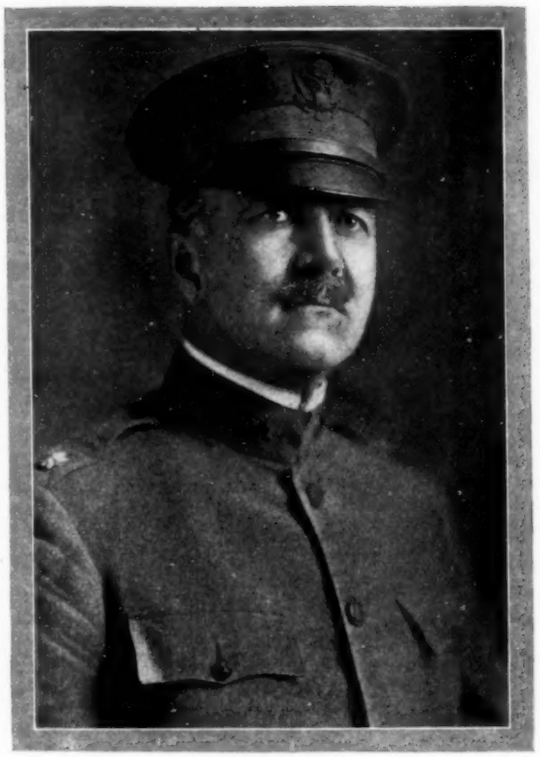
**Major Henry Souther,** vice-president of the Henry Souther Engineering Company, Hartford, Conn.; general manager of the Ferro Machine and Foundry Company, Cleveland, Ohio, and major in the United States Officers' Reserve Corps, died at Fortress Monroe Hospital, Va., August 15, due to not surviving an operation resulting from an acute development of a recurrent malady of an indigestional nature.

Major Souther was born in 1865 at Boston, Mass. After graduating from the Massachusetts Institute of Technology and taking post-graduate work at the leading metallurgical schools in Germany, he was employed at the works of the Pennsylvania Steel Company, Steelton, Pa. Later he was identified closely with large bicycle production in metallurgical and general consulting capacities. He brought from this field to the automobile industry much valuable engineering data, including results of tests of pneumatic tires of the fabric and of the cord types.

Elaborate tests of internal-combustion engines of the automobile type were conducted. An exhaustive series of inlet valve closing researchers was made, involving the first use in this country of such instruments as the Mathot indicator and the Carpentier-Hospitalier manograph, and establishing may features upon which modern automobile engine testing is based.

Major Souther conducted for many years at Hartford, Conn., the chemical and physical laboratory, bearing his name. At this laboratory tests and analyses were made of all representative foreign and domestic steels and of many other metals, including aluminum and bearing materials. Also the first of the White-Souther alternate stress testing machines was installed in this laboratory.

Major Souther for the past year was associated with the Aviation Section of the Signal Corps, first as consulting engineer and later as Major.



MAJOR HENRY SOUTHER,
UNITED STATES OFFICERS' RESERVE CORPS.

# TRADE NEWS

BUSINESS REPORTS OF THE METAL INDUSTRY CORRESPONDENTS

## WATERBURY, CONN.

October 8, 1917.

Within the past month Waterbury has sent away over 1,000 men to the National Army and with upwards of 200 still to go, there are many familiar faces missing from the big metal industrial plants here. Some of the best families of the city, whose sons and fathers have been prominent in industries popularly considered more or less necessary to national efficiency in war time, share with the humblest families the distinction of having contributed to the fighting manhood of the nation boys who have been found fit.

Industrially, the metal manufacturing institutions of Waterbury and the Naugatuck valley continue to be prosperous and exceedingly busy. There have been few indications of any slackening of the driving pace that has held for so many months and there are no indications that a change to a slower pace is imminent. At the same time, there is a noticeable tightening in the management of all concerns for the evident purpose of keeping in the safe current of the stream. No one feels that he knows the future well enough to let one day's business take care of itself and so it is that the men who manage are always close to the pulse of their industries. Troublous times are troublous times, whether or not they are dividend paying periods, and no one knows it better than the Naugatuck valley manufacturer. While business continues good there are no indications of a permanent run in that direction so there are no reckless departures from conservative and carefully studied policies.

Labor is still king of the wage situation. Prices for labor are high, although labor itself is not particular about some things that would compensate for this condition. Hence it is that care must be taken in every large plant to keep up the standards of efficiency and to run no risks with reckless help, particularly those indifferent to the rules forbidding intoxication.

There is now and then some pleasing demonstration of the loyalty of workmen when concerns that are quite short of hands seek out young men to fill up their ranks even though they may be employed in some other local plant at very good wages. The habit of jumping about is not so much indulged in as it was early in the "boom" period which began in the spring of 1915.

Freight difficulties continue to absorb attention and to make traffic departments more and more valuable in those concerns which have organized them. Materials come through fairly well, but they must be watched in transit with great care or they may be subjected to costly delays. Freight cars come faster than the railroad forces here can handle them, but the situation has developed some latent traffic handling talent in manufacturing concerns which is valuable.

One of the big plants of the city has had the fine compliment paid to it of being taken as a model for the study of the labor conditions in a munitions plant by the United States government. This is the Scovill Manufacturing Company, and the methods followed there seem to have won praise as well as careful attention from the government investigators.

Building on the Scovill additions, recently announced in these columns, continues rapidly and winter will find several departments, which are now hampered by lack of room, splendidly housed.

The American Brass Company's great plants continue to work practically at their capacity, while the extensive new buildings of the Chase Companies, Inc., at the old plants and in Waterville, are occupied with workers and machinery as fast as the contractors can turn them over.

Factory owners who are pushing plans to provide additional homes for employees are busy about completing an extensive program before the winter and as a result hundreds of families will eat their Christmas dinners in beautiful modern model homes in various parts of the city, to which they have fled from the rent sharks and advanced considerably on the road to independence.—F. B. F.

## BRIDGEPORT, CONN.

OCTOBER 8, 1917.

Bridgeport has gained the reputation throughout the country as being the "munitions city," and it must be admitted that this title is well deserved. Not only is Bridgeport a cosmopolitan manufacturing city in other branches, but she specializes in the manufacture of war materials. For this reason there has been in the past a strong rumor coming from nobody knows where, that as soon as the war was well settled to its pace, the work in Bridgeport would drop and there would be many first-class mechanics stranded here without places for them to occupy.

There has been made recently in Bridgeport a rather rough but nevertheless fairly indicative report of the work that Bridgeport is doing at the present time and is to do in the future. This work is presented in figures for the reason that they are more readily comprehended. To show that work in the metal trades in Bridgeport will continue for at least two years, and with scarcely any doubt for a longer period than that, if not indefinitely, the following statements from authoritative sources are published.

The Lake Torpedo Company has now under contract the building of 20 submarines with a time limit of two and a half years, the total cost of construction being $16,000,000. The Bullard Machine Company has Government contracts for gun parts and guns which will total $7,500,000. The Locomobile Company has Government orders for trucks for military use approximating $7,000,000. The Union Metallic Cartridge Company has orders from the Government for 100,000,000 .30 Springfield cartridges with an estimated cost of $5,000,000, and they are now employed on an order for 700,000,000 which they received last June.

The Bridgeport Projectile Company has received Government orders for three-inch shells and five-inch guns, totaling about $4,500,000. The Bridgeport Brass Company has received an advance order from the Government for gun parts, totaling, roughly, $500,000. It is stated by authorities who should know the facts that larger orders are to follow in the very near future. Besides these Government orders mentioned above, there are a great many more shops and factories in the city which have orders of smaller totals than these.

The American Graphophone Company, the Gaynor Manufacturing Company, and several other factories have their share of Government work.

When it is taken into consideration that all the above work is for the government alone and does not include the private business of all these companies, business which will continue in the future as it has in the past, it is easily seen that Bridgeport so-called "boom" is not of the fly-by-night order, but is here to stay for some time if not permanently.

In all the metal factories of the city "optimism" is the slogan and without exception all the manufacturers state that business has hardly ever been better and that the outlook for continued prosperity is as good now as it has ever been. The silver companies, of which there are several in the city, are now enjoying practically all the business they can handle and most of them have orders for the future already booked or nearly so.

The brass companies, besides the government work which most of them are doing, are also receiving large private orders and nearly all the plants are working at their highest capacity. Casting and foundry plants of all kinds are working overtime, some of the shops putting on three shifts a day. The American Tube and Stamping Company has both of its plants running at top notch and the rest of the stamping and drawing factories are doing likewise.

The recent trouble with the polishers has been settled and polishing is going on as usual. Individual polishing plants are not in much prominence in this city, but in every factory in Bridgeport there is a large polishing department. Several thousand men are now employed in the city as polishers and buffers and there is a persistent rumor that there is room here for more of them.

Business in Bridgeport is now at top speed in spite of the recent reports that it was letting down. Business in Bridgeport will continue in the future in nearly as great a degree as at present if the statements of the men who head the various enterprises of the city are to be taken as worth anything. Bridgeport is booming, there is no doubt of that, but Bridgeport business, and when you say that you say the metal business, is booming in the right way—permanently.—L. M. P.

## NEW BRITAIN, CONN.

OCTOBER 8, 1917.

With every factory engaged in the manufacture of metal products, from those manufacturing pins and needles to the big corporations turning out massive lathes and machinery, working at top speed, New Britain's industries are today in a better condition than they have been at the close of any previous summer season in many years. While all local concerns are not taxed to their limit, all have ample orders to keep their employes busy and two or three of the larger factories have had to put on night shifts. Particularly is this latter statement true at the Traut & Hine Manufacturing Company, where there has been an abrupt reversal from the hum-drum business of peace times to the present bustling activities in turning out a big Government order. A short time ago the company entered into a contract with the War Department to produce several million snaps used in the canteen equipment of the soldiers. In addition to turning out the finished snap, this concern is now also manufacturing the rivets used in their construction. An idea of the size of this war order may be obtained from the statement of President George W. Traut, who says that the consignment will total "three or four millions." To complete this order the concern will have to work at maximum speed for at least six months. At present one department is operating twenty-four hours a day and others are working until 9 and 10 p. m. The Traut & Hine Manufacturing Company is a concern akin to the North & Judd Manufacturing Company, which is also working on Government orders for buckles and snaps for the army.

The New Britain Machine Company, working both a night and a day shift, is turning out products used by the Government, principally standards for anti-aircraft gun mounts and parts of hydraulic speed gears used in the manipulating of the big guns in forts and on the battleships. In order to handle its part of the Government's work this concern has sub-contracted with the Connecticut Electric Steel Company to furnish a million and a quarter pounds of steel castings. The Stanley Works has ample orders and the various departments of the American Hardware Corporation, including the P. & F. Corbin, the Russell & Erwin, the Corbin Cabinet Lock and the Corbin Screw Corporation, are also well supplied with business. The Rockwell-Drake division of the Marlin Arms Company is erecting a factory addition to care for its increased business, and so is the Trumbull Electric Company. The Union Manufacturing Company, manufacturers of chucks, etc., is having to rush its men to handle orders, and the Skinner Chuck Company, where a recent strike hampered business for a couple of weeks, is again running smoothly.

While the local factories, particularly those actually engaged in turning out Government work, have presented many claims asking that their employes be exempted from the draft, it is understood that the district boards are very wary in granting these petitions. A general view of conditions as they exist at present are that the coming fall and winter is to see plenty of work at the various factories, and there is nothing to indicate that any of the concerns will have to cut down on their working hours.—H. R. J.

## PROVIDENCE, R. I.

OCTOBER 8, 1917.

Never in the industrial history of Rhode Island has there been so many men employed in the various branches of the metal and allied trades, and never has there been such an active demand for still more operatives in all of these lines than at the present time. Nor does there seem to be any indication of any improvement of either horn of this dilemma.

It is now nearly four years since the world's war created a constantly growing demand for almost everything in the metal line, and each month during this period has intensified the conditions and situation. Orders have become more and more numerous; demands more and more insistent; help more and more exacting as to wages and hours, while at the same time difficult

to secure; supplies of every description becoming more and more expensive and all the while decreasing in quantity; and the competition for mechanics, machinists and metal workers of all classes through the activities and necessities of the Government, either directly or indirectly, has added to the other handicaps under which the several concerns have labored.

But notwithstanding all of these, coupled with freight embargoes, car shortages and other drawbacks, business in general among the metal workers continues to establish new records for hours, productions and returns. Everybody is more than busy, many operating their plants on day and night shifts, and in some instances on three shifts each 24 hours, and still the orders pile up faster than they can be filled and shipped.

With the opening of the new school year at the Rhode Island School of Design several new vocational and industrial courses are being added that will greatly enhance the importance of the institution in its association with the industries of the State. Drafting, designing, modeling and similar work has been a feature of the school ever since it was first opened and these lines have been extensively developed through co-operation on the part of manufacturing concerns and interested individuals. Scholarships by city, State and commercial associations and manufacturing corporations have served to create an interest among the students in these departments, with the result that a number of very meritorious artisans have been graduated by the institution during the past few years, and the manufacturers have experienced very satisfactory and beneficial results.

The new courses that are being established in connection with the department of jewelry and silversmithing are, silversmithing design, under the direction of Clinton D. Barratt, an expert designer in the employ of the Gorham Manufacturing Company; electro-plating or coloring, under Adolph Alsfeld, for fifteen years in charge of the coloring department of S. & B. Lederer, and since employed in a number of factories in installing modern and scientific coloring departments in manufacturing jewelry plants.

These courses have been formally endorsed by the board of directors of the New England Manufacturing Jewelers' and Silversmiths' Association, and the manufacturing jewelers of Providence and the Attleboros are being urged to take full advantage of the opportunity offered, by presenting the department with scholarships and by sending young men from their employ who have the proper qualifications to take the courses, especially that of electro-plating.

Seven manufacturing jewelry concerns that are members of the New England Association have already agreed to send one or more young men to take the electro-plating course and will give the necessary scholarships to cover the course of instruction. These firms include Whiting & Davis Company, of Plainville; Freeman, Daughaday Company, of Chartley, Mass.; Cutler Jewelry Company, the Ostby & Barton Company, the Wolcott Manufacturing Company, and the Manchester-Smith Company, all of this city.

Upon the petition of Harry M. Mays, treasurer and one of the largest stockholders of the Metal Products Corporation, manufacturers of jewelers' findings and jewelry novelties, corner of Eddy street and Thursber avenue, this city, Presiding Justice W. B. Tanner, of the Superior Court for Providence, has appointed two receivers to take charge of the firm's affairs with authority to conduct the business, make collections and pay bills until November 1, when a report is to be filed of their actions. In the meanwhile all creditors' claims are to be presented, examined and adjusted by the receivers. The receivers appointed by the court are Henry Fletcher, treasurer of Fletcher-Burrows Company, manufacturing jewelers, and Joseph P. Burlingame, of J. P. Burlingame Company, manufacturers of jewelers' findings. The liabilities are estimated at about $180,000 and the assets at $350,000. The concern ,which was incorporated under the laws of Rhode Island in 1902 with a capital stock of $150,000, is one of the largest in its line in New England, and it is expected that its affairs may be adjusted so as to enable it to continue business. The Screw Machine Products Company, occupying the same building, and in which a number of the officers and stockholders of the Metal Products Corporation are also interested, is in no way involved in the difficulties of the latter corporation.

The Universal Plate & Wire, which was recently incorporated under the laws of Rhode Island by Charles C. Mumford, George H. Huddy, Jr., and E. Butler Moulton, all of Providence, has purchased the plant and assets of the Uniform Seamless Wire Company, which was recently sold at auction to Conley & Straight, refiners of this city. The capital stock of the new corporation is $100,000, divided into 1,000 shares of $100 each, and the officers are Phanuel B. Carpenter, president, and Elijah J. Astle, secretary and treasurer. The equipment of this company, located in the shop of its predecessor, at 71 Peck street, is complete and up to date in every respect.

The Rhode Island Welding Company is erecting an addition of brick and wood to its plant on Wood street.

Extensive alterations and repairs are being made to the three-story brick factory building of the A. J. Astle Company, 10 Peck street.

## BOSTON, MASS.

October 8, 1917.

Local foundries and machine shops are feeling the shortage on labor and raw material, and in an effort to counteract the stringency contemplate resorting to the adoption of female labor. Nothing definite has been decided upon, although it is felt that something must be done in the near future to remedy the defect. The matter is now before the association of New England Foundrymen and the local branch of the Metal Trades' Association, and it is hoped that a way out of the difficulty will be found. One of the principal factors in the situation is the lack of cars for transportation, owing to the government demands. New England is undergoing a strain in this respect. Several of the railroads have cut down almost to the point of negligence the number of trains serving the local industries, and the Boston Chamber of Commerce and allied organizations have held several meetings on the subject in an effort to relieve the situation, but so far have effected but little alleviation.

The spectre "strike" has invaded three of the local plants, and it is feared somewhat that a general "walk out" may result. The local association is bending all its energies to prevent any spreading of the affection, and is meeting with some success. During the last two weeks three shops were visited by strikes, namely, the Wade Machine Company, the United Injector Company and the S. A. Woods Machine Company, all of which maintain large foundries. The men demanded the eight-hour rule and an increase in wages. So far about 700 men have quit work The firms in each case have refused the demands of the workmen, and at the present time there is a virtual deadlock, although there are signs that the strikers will eventually yield and return to their jobs.

Unfortunately the labor market is tighter than ever; and in consequence production has been seriously delayed. Furthermore, the draft has made a deep inroad in the ranks of skilled mechanics, so that employers are at their wits' end to know how to cope with the difficulty.

A large amount of government work is being done in this territory. Contracts have been awarded for the manufacture of shells, gun mounts and all kinds of machine tools and equipment devices going into machinery.

The location association has prepared its programme of social and business functions. The educative part will consist largely of topics dealing with the industrial situation and the war.—R. T. E.

## ROCHESTER, N. Y.

October 8, 1917.

The metal situation in this city has undergone some change during the past month, owing to the attitude of the government in the matter of price-fixing. Business has slowed up to a marked degree, most large users of metals preferring to wait until the government has finally adjusted conditions. It is readily understood that much depends on future business conditions by the manner in which the price-fixing finally affects the country at large.

The situation has not cleared up in this city to any extent, inasmuch as all materials desired at this time are still quoted at top prices. Copper and brass were somewhat easier of late. Local manufacturers have been given to understand that the price fixed for copper is fair, and that it will leave prices in this city practically the same as have prevailed during the past month

or more. The market for spelter is weak and prices are high.

There has not been a great deal of buying of late, except for extraordinary business. Because of the present crimp in affairs the outlook all around is not so rosy as it was in the early summer, but from the fact that consumers must have the manufactured output it is expected that in due time the demand will alter the situation. None of the large local users of metals expect a marked reduction in prices before January 1.

Business is still at high tide at the Eastman Kodak plants, all departments running at full speed and dividends in common and preferred stock making new records almost each quarter.

The Bausch & Lomb Optical Company has found it necessary to enlarge its present plant materially, because of heavy government contracts entered into. The company is making range-finders for naval guns, submarine periscopes, aiming circles, battery commander telescopes, searchlight mirrors, microscopes for hospital service, and field glasses. A tremendous amount of brass, copper, zinc, antimony, and aluminum will be required by this big concern. Much platinum is used, too, in telescope making. The new building will be 400 feet in length and five floors in height. It is hoped that it will be ready for occupancy on January 1. About 2,000 additional employes will be required. It is reported that the company yesterday let contracts for a number of immense stamping machines to the E. W. Bliss Company, of Brooklyn, N. Y.—G. B. E.

## CLEVELAND, OHIO

OCTOBER 8, 1917.

War is reflected in every industry in the Cleveland district, and the metal industry is no exception to the rule. Most significant of all effects, however, is the alarming traffic situation, which at the moment bids fair to hamper all lines of commercial endeavor unless speedily straightened out. The complaint has been made by the roads in this district that they have been unable to meet demands of commerce because they were required to move soldiers and munitions to training camps. To their credit, in the last month, the roads have moved more than 500,000 men, without mishap. The excuse that they cannot meet the needs of men of business, however, is past. Action now is demanded by every representative of business. At a nearby future meeting, transportation aspects of the Cleveland coal situation, which also is a reflection of present conditions, will be discussed at a Chamber of Commerce meeting. Forty representatives of railroads are expected to be present at this gathering, which will be under the direction of the industrial committee. Manufacturers will be requested to present their views. They will tell that if materials are not received here many factories will have to close down, even though they are working on Government orders. A committee of these business men will be appointed to draw up a plan of remedy, and if necessary this committee will be sent to Washington to lay the problem before Government officials. In preparing its case on the shortage of materials, as a result of tardy action by the railroads, this committee will also present the problems of the manufacturers in regard to the coal shortage here. In the metal industry this problem is becoming more important every day, as the natural gas supply, upon which many of the metal producing establishments have depended upon for fuel in the past, is slowly vanishing, and something must be had to take its place.

Another angle of the war is reflected in the movement of the Department of Education here to obtain the co-operation of manufacturers in forming Americanization classes for the foreign born and part time classes for shop workers. The classes are to be established to aid those who were compelled to leave school too early in order to make their own livings. The Employment Managers' Association will co-operate in the plan.

The Glenn L. Martin Company, which has just been incorporated for $2,500,000, is going ahead with its plans for making aeroplanes for the Government. C. E. Thompson is president of the company and M. Martin, vice-president. Plans for a building, costing $75,000, already have been filed here. The directorate includes C. W. Bingham, W. G. Mather, C. E. Thompson, S. L. Mather, A. S. Bradley, C. N. Osborne and Glenn L. Martin. More than 450 men will be employed in the plant here. Plans are for the production of commercial aeroplanes as soon as the needs of the Government have been filled.

The A. P. Schraner Pattern Works is preparing to move into a new building in the Payne avenue and East Thirty-third street section. A site 57 x 140 x 87 feet has been purchased, and a $50,000 building will be erected upon the property. Increasing business demands this change.

The Kanter Metal Stamping and Manufacturing Company has purchased the plant of the National Lamp Company at Conneaut, and will remove there as soon as alterations can be completed. A feature of the change is that there are switching facilities for twenty cars.

Still another feature of the war in metal materials production is seen in the sudden expansion of the aluminum products industry in this district. A well-known firm announces itself ready to produce aluminum kitchen utensils copied and patterned after those produced by Germany before the war, and declared by the Germans to be impossible of reproduction in this country. Metal toys, such as cars, engines, soldiers and the like, now are being produced at the Bowman-Rosterman Company, Canton, Ohio, although up to the beginning of the war this industry was supposed to be held exclusively by Germany—which stamped the products out of old tin cans shipped in bales from this country.

To care for increasing business the National Copper Refining Company has obtained a permit to erect a storage plant on Trumbull avenue. It will occupy a plot 30 x 35 feet, and be one story high.

The Guide Motor Lamp Company has outgrown its quarters in West Madison avenue, and has purchased property near Nickel Plate Tracks and East 152nd street, where a modern factory building will be erected. The property adjoins several other metal industry shops, as this section is becoming a center for that line of business.

The Ohio Bronze Powder Company has increased its capital stock from $50,000 to $200,000. The company manufactures a complete line of gold and aluminum products. With the increase in capital it is planned to increase production. Orders for new machinery will be placed this fall. Work will begin in the spring upon a new factory building which will also house offices and warehouse facilities. The plant is located at Nickel Plate Tracks and East 152nd street.—C. C. C.

## COLUMBUS, OHIO

OCTOBER 8, 1917.

The metal market in Columbus and central Ohio territory is rather quiet in every respect. In view of governmental regulation of price, buying and selling is at a standstill as far as possible. Buying only when absolutely necessary is reported. Manufacturers of metals have some stocks ahead and are not in the market for any large quantities. In fact the market is rather unsettled, until it is seen what prices will be, and then a buying movement is anticipated.

Brass is quiet and prices are unchanged from the previous month. The same is true of copper. There is a better demand for tin, although prices are not as strong as formerly. Aluminum is moving fairly well. Zinc is rather steady, and the same is true of other standard metals. Babbitt and type metals are selling well, but prices have been shaded recently.

The Metals Manufacturing and Alloy Company, of Cleveland, has been incorporated with a capital of $60,000. The incorporators are: George Gardiner, G. D. Ewert, J. W. Hayward, D. J. Gardiner and F. M. Flick.

The Packard Brass Manufacturing Company, of Cleveland, has been incorporated with a capital of $10,000. The incorporators are: L. Wurstner, E. Weinberger, William Gibson, S. M. Davis and W. D. Cole.

The Salem Brass and Bronze Company has been incorporated with a capital of $25,000. The incorporators are: C. J. Rath, J. M. Lyle, R. F. Fawcett, H. L. Bonsell and H. R. Kale.—J. W. L.

## DETROIT, MICH.

OCTOBER 8, 1917.

All brass, copper and aluminum manufacturing companies still are found operating favorably and are said to be in better financial condition than for many years. The call for munitions, automobiles and other products, demanded in the war, and re-

quiring metal construction is responsible for this excellent condition. Plants for many months have added to their productive facilities and are now employing more men than at any time in their history.

The greatest handicap is that of obtaining raw material, and it is feared that when the cold weather sets in coal also will be scarce. As it is at present many manufacturers are somewhat anxious as to winter conditions. However, labor conditions are fair, no strikes of consequence are hampering, and taking all conditions into consideration the Detroit metal trades are in good condition.

There has been question regarding the automobile business holding up during the present uncertain conditions, but a careful investigation in this line which is so closely allied with the brass and aluminum industry, shows that practically all the great concerns operating in the Detroit district are producing more cars today than at any time in their history. This includes touring cars as well as trucks. Mr. Prensky, comptroller of the General Motors Corporation, which operates eleven of the greatest automobile plants in the city and outside, says never in the history of the business has the General Motors Corporation been so busy. Many of these plants are engaged on heavy government contracts. Brass, copper and aluminum in great quantities are used by all, and most of them maintain extensive foundries.

The high cost of metals are causing considerable anxiety among manufacturers, this particularly being true among the electrotypers. Many of them are here attending the International Electrotypers' Association meeting; among them being President Harris B. Hatch, of Philadelphia, and Dr. William Blum, associate chemist of the bureau of standards.

Among the concerns of Detroit that have expanded is the Enterprise Electro Plating and Manufacturing Company. The concern recently, it is reported, installed a complete new set of burnishing barrels, tumbling barrels and mechanical plating barrels. Charles G. Bennett is treasurer, secretary and manager, and James D. Burke, vice-president and superintendent.—F. J. H.

## LOUISVILLE, KY.

October 8, 1917.

Someone slipped a pin to the bubble that the local coppersmiths had been entertaining relative to converting beverage distilling plants into alcohol houses. When it was announced that the food control bill had passed, and that the beverage distilling plants would close early in September, the idea was entertained that many of these beverage plants would be converted into alcohol manufacture, but the percentage of such plants is too small to tackle the alcohol proposition. In Kentucky there are about 200 distilling concerns, some of which have not operated their plants for several seasons, others having even been dismantled. However, eleven of the larger ones, probably with a combined capacity of 75,000 gallons of alcohol a day, are operating, but are losing money on contracts taken with the allied governments prior to the big jump in grain values.

A little copperwork has resulted for the local people in connection with the placement of the cantonment, Camp Taylor, at Louisville. The Vendome Copper & Brass Works received a nice contract from the Vogt-Price Stock Feeding Company to erect a plant which will be used for converting the oils, bones, vegetable matter from the camp refuse. The oils and greases will be sold to soap concerns, while the bones will be utilized in fertilizer, and vegetable matter in stock or hog feeding.

The copper market is a bit unsteady at this time, and much uncertainty is lending itself to the situation. While the copper producers or miners have placed a price of 17½ cents on all copper used by the Government, directly or indirectly, and also to the large buyers, no weakness is being shown in the market, and old prices are expected to continue until old manufactured stocks are off. The sheet and tube mills are apparently working up high-priced copper and holding prices till this material is out of hand. In the meantime ingot is quoted for actual delivery at about 23½ cents; sheet, base price, 35 cents; tubes, base price, 43 cents. Big buyers might be able to shade prices considerably, but there is no big buying demand at this time.

The supply of scrap metals on the market is very short at this time, dealers having been shipping out stocks as fast as accumulated due to the uncertainty of market conditions. Practically no scrap steel or iron is on hand, and brass and copper scrap has been well cleaned up for weeks. Copper generally follows ingot fairly close, and such scrap as is on the market is valued at about 23 to 24 cents. Scrap brass commands 11 and 12 cents.

A new concern which expects to shortly begin manufacturing brake valves, and which promises to be a large consumer of copper and brass, is the Gault-Phillips Brake Valve Company, of Louisville, which has been incorporated with a capital stock of $50,000 by Joseph P. Gault, William Phillips and Benjamin L. Bruner. The limit of debt is $50,000. Officers of the company are not prepared to go into much detail of the company's plans at this time, other than that it expects to locate a plant in Louisville to manufacture brake valves for use on steam and electric cars.

On September 1 the Standard Sanitary Manufacturing Company, of Pittsburgh, Pa., which operates the old Ahrens & Ott plant in Louisville, formally took over the business of the Ahrens & Ott Manufacturing Company, of Louisville, which for years has been the jobbing department of the big Pittsburgh concern, which controls a number of manufacturing plants, manufacturing brass, enamel, and other plumbing and steam goods. The Ahrens & Ott Manufacturing Company at one time controlled the local plumbing goods manufacturing plant, which was sold to the Standard, and for years has itself been a subsidiary corporation.—O. V. N. S.

## TRENTON, N. J.

October 8, 1917.

The federal draft has had some effect among the employees of some of the metal industry plants in this city, and only those employes who could prove that their employment was a necessity for the good of the government escaped the call to arms. There is a proviso in the government draft which says that young men between the ages of 21 and 30 who are employed on munitions or on articles needed by the government in its war against Germany shall not be conscripted. During the recent examinations for young men for the army those employees of the Jordan I. Mott Company, Delaval Steam Turbine Company, Standard Fuse Corporation, and the John A. Roebling's Sons Company who proved that they were working on articles needed by the United States government were exempted from military services. When it became known that the government would not call such males employed on this particular kind of work many young men sought positions in metal plants to escape army duty. The Mott company is working on a munition order for the government and is having the same carefully inspected by government inspectors. It requires considerable skill in the manufacture of the munition article and hundreds of these have been spoiled and had to be recast afain.

Munitions for the government are also being turned out at the Bordentown, N. J., plant of the Standard Fuse Corporation. The time fuses are then sent to the Paulsboro plant, where the finishing touches are put on. The Paulsboro plant, which has been closed since April 1, when contracts for fuses for the Russian government expired, has resumed operations again for the manufacture of ordnance primers for which the company has a large contract. In addition, airplanes parts will also be made. Several acres of ground adjoining the plant have been purchased and several large additional buildings are contemplated. The plant expects to be very busy for many months to come and the prospects at the Bordentown plant are also very bright for a busy winter.

The machine shops are running to their maximum capacity, the only kick the manufacturers have is the great scarcity of skilled help. Government work at high wages has drawn many from other branches of mechanical labor. The Westinghouse Lamp Company, which will soon place its new plant here in operation, has a novel plan to keep its skilled help from securing positions elsewhere. The company offers many inducements to its help. All the employes will be furnisheed with first class meals at cost price, will be given separate lockers and wash rooms, a dance room in the plant and will have a trained nurse to look after their ills. William Hepple, general manager of the Trenton plant, says the company cannot afford to lose its skilled help and take the time in breaking new hands. "It is a great loss to a manufacturing establishment," he said to a representative of THE METAL INDUSTRY, "to spend the time breaking in a new hand and

then have him leave. The Westinghouse Company has always looked after the comfort of its help and makes the surroundings pleasant so that they will be satisfied. Ventilation and light is also an important factor. The same help means a saving to an establishment."

The American Metal Treatment Company, of Elizabeth, N. J., will build a storeroom at Broadway and Division streets, to cost $9,325. The new plant of the New Jersey Chemical Company, producers of zinc oxide, is finished and will be occupied soon. —C. A. L.

## NEWS OF THE METAL INDUSTRY GATHERED FROM SCATTERED SOURCES

The Waterbury Buckle Company, Waterbury, Conn., is building a one-story brick addition, 16 x 34 feet.

As the site for additions to its plant, White & Brother, Inc., Philadelphia, Pa., acquired title to a tract of land containing in all about twenty-seven acres.

The Doehler Die-Casting Company, Court and Ninth streets, Brooklyn, N. Y., has had plans prepared for a one-story addition about 42 x 290 feet to cost $18,000.

The Pacific Platinum Works, 229 East Ninth street, Los Angeles, Cal., has acquired property and has had plans prepared for a one-story factory, about 30 x 100 feet.

The Canadian Hanson Van Winkle Company, 15 Morrow avenue, Toronto, Ont., Can., manufacturer of foundry supplies, is building a one story addition to its plant at an estimated cost of $6,500.

The F. B. Williams Company, manufacturer of hardware specialties, Chicago, Ill., is building a two-story addition to its present plant at 507-509 East 39th street at an estimated cost of $15,000.

The Chase Metal Works, Waterbury, Conn., has begun the erection of a one-story building, 60 x 120 feet, and the Chase Rolling Mills Company, Waterbury, Conn., is erecting a storage building, 67 x 74 feet.

Arthur T. Rutter, 256 Broadway, New York, has become the general sales agent for the Continuous Casting Corporation of Garwood, N. J., for their full line of brass and copper sheet rolling mills and brass rod mill machinery.

The Pilling Brass Company, Waterbury, Conn., by J. H. Pilling, secretary, states that the published report that the Pilling company has been sold to the Liggett interests, owners of the Connecticut Brass Company at Mixville, Conn., is premature.

The Dayton Bronze Bearing Company, Dayton, Ohio, has acquired a site adjoining its plant on East Third street on which it intends to erect an extensive addition at an early date. The company operates a brass, bronze and aluminum foundry.

The West Bend Aluminum Company, West Bend, Wis., announces that it has not completed plans for the erection of a three-story addition, 72 x 190 feet, and a one-story auxiliary building, 50 x 60 feet, nor has the contract been let for same, as was reported.

The Royal Sand Company, Columbus, Ohio, recently organized, has opened an office in the Grand Theatre building and will deal in molding sand, silica sand, core sand, fire brick and fire clay. F. A. Downerd is president and H. L. Cabot, vice-president and general manager.

The Wright Wire Company, Worcester, Mass., is putting in the foundation for a tempering building, 92 x 200 feet, one story at its Palmer, Mass., plant. A tool room, galvanizing, tinning, plating, polishing, japanning, lacquering departments are operated at this company's plant.

S. J. Stewart, 312 Carondelet street, New Orleans, La., is installing some new foundry equipment. Mr. Stewart advises that he has purchased a large part of his equipment, but that he is still interested in new appliances. He operates a brass, bronze and aluminum foundry and casting shop.

The address of G. A. Baudet, of the Baudet Manufacturing Company, manufacturers of the Baudet Three-In-One oxy-acetylene welding outfit, is 351 West 57th street, New York, instead of 222 West 57th street, New York, as given in the September issue of THE METAL INDUSTRY.

The John Knape Machine Company, Grand Rapids, Mich., has almost completed the erection of a brass foundry costing about $4,000. Besides a brass foundry the company operates a brass machine shop, tool and grinding room, stamping, brazing, soldering, plating, polishing, japanning and lacquering departments.

The Davis Manufacturing Company, Milwaukee, Wis., has awarded the contract for the erection of a new core building, 92 x 100 feet. The company is also completing work on a large foundry and machine shop. They are operating at the present time a small brass, bronze and aluminum foundry, tool and grinding room.

The M. S. Little Manufacturing Company, 94 Allyn street, Hartford, Conn., manufacturers of brass goods, expects to erect a one story factory in the near future. The Little Company operates a brass machine shop, tool and grinding room, cutting-up shop, stamping, brazing, soldering, plating, polishing and japanning departments.

Statements made recently by manufacturers of buffing and polishing compositions indicate that on account of the continued advance in the price of fats which are used in the manufacture of these products, and on account of the shortage of tin plates used for containers, the prices of buffing and polishing compositions are likely to be increased before long.

Additions involving the expenditure of $15,000 and practically doubling the space and capacity of the plant are under way at the Republic Brass and Bronze Company, Pontiac, Mich. When completed and in operation approximately 125 men will be employed and the company will immediately begin manufacture on $500,000 worth of castings for the United States government. The Republic company is controlled by the Precision Die Casting Company of Syracuse, N. Y.

The Standard Brass Casting Company, Oakland, Cal., has erected a 50 x 100 feet brick addition to its foundry and has installed two new Schwartz furnaces, three new aluminum kettles and two new compressors. The company has also erected an addition 40 x 40 feet to its machine shop and installed 12 new machine tools and they expect to install a new ten-ton electric crane during October. The company operates a brass, bronze and aluminum foundry, brass machine shop, tool and grinding room, casting shop, cutting-up shop, plating and polishing departments.

The Diamond Manufacturing Company, Pittston, Pa., is moving to Wyoming, Pa., where it will occupy a larger plant, the main shop of which is 60 x 160 ft., and equipped with the latest machines for the perforation of metals. The company will also operate at Wyoming a brass and bronze department, handling metals of all alloys. In the near future the company expects to install a rolling mill, in which it will not only make its own billets but will roll them and furnish sheets to the trade. Growth of the business necessitated the change.

The note published in the September issue of THE METAL INDUSTRY stating that the Ohio Blower Company, Cleveland, Ohio, expected to exhibit at the Foundrymen's convention in Boston, Mass., September 24 to 28, was not correct. The exhibit in question belonged to the Cleveland Blow Pipe and Manufacturing Company, Cleveland, Ohio, and was made up as follows: A dust collecting system for removing dust from buffing, polishing, emery and grinding wheels, covering a direct-connected exhaust fan and motor dust collector, piping and elbows and various designs of hoods. Also a two-section shower bath for foundry and factory use.

The H. Mueller Manufacturing Company, which operates plants at Decatur, Ill., and Sarnia, Ontario, has bought 65 acres of land at Port Huron, Mich., where they are about to erect a new plant. This Plant at the start will consist of a power house about 60 by 100 feet, a red brass foundry about 70 x 200 feet and a casting shop and rod mill about 80 x 300 feet. They are also contemplating building an iron foundry on the same property. The location has the advantage of connections with two railroads, and is on the water front. Electricity will be used altogether for power, and the company is in the market for electrical power plant machinery and equipment.

The F. H. Lovell Company, Arlington, N. J., manufacturers of marine and railroad lighting appliances and powder cases for the United States Government, has about completed remodeling its foundry which is modern in every respect, even to shower baths for the workmen. The foundry is extremely well ventilated and the zinc oxide fumes from the yellow brass give very little trouble. The company has one of the best, if not the best, brass foundries in the Newark section, and when the installation of the oil furnaces has been completed will have a daily melting capacity of 35,000 to 40,000 pounds of brass. The furnaces will consist of twenty-five pit type and six oil furnaces. The foundry is now being put on an efficiency basis by W. R. Dean, foundry manager and efficiency engineer, who will introduce the Emerson system of efficiency. The company is at the present time filled with orders and until all furnaces are in order will run a day and night shift.

The display of Facamold at the booth of Stanley Doggett, Inc., of New York, at the Boston Exhibition was one of the centers of attraction. In these times of high prices and scarcity of anything of the nature of graphite, the Facamold parting material just placed upon the market by Stanley Doggett comes as a great relief to the foundrymen. This material, which geologists have given the name of graphitic-talc, completely displaces graphite and other parting compounds and according to Mr. Doggett is used at one-third of the cost of the other materials.

Facamold is found in nature in the form of a rather soft lump material which has the appearance and characteristics of both graphite and talc, but cannot be called rightly by the name of either. The material is taken from the ground, crushed to the proper degree of fineness, packed in bags, kegs and barrels and is ready for shipment. Further information regarding this material may be had by corresponding with Stanley Doggett, Inc., 99 John street, New York.

## CLEVELAND BRASS & COPPER MILLS, INC.

The third week in September marked the first turning of the wheels in the just completed plant of the Cleveland Brass & Copper Mills, Inc., at Euclid, Ohio. The new mill will produce sheets and rods in brass, copper and bronze. Financed largely by Cleveland capital, the new concern is remarkably strong in the personnel of its directorate and operating executives. At the head is H. C. Osborn, also president of The American Multigraph Company, while the other directors are actively connected with many of Cleveland's largest industrial enterprises.

In charge of production is B. F. Brusstar, who resigned his position as general manager of the Michigan Copper & Brass Company, Detroit, Mich., where he had been located previous to his move to Cleveland. Few men in his line have had the opportunity for broad experience which has fallen to Mr. Brusstar's lot. In addition to his six years in Detroit, he was in charge of the brass mill department of the Winchester Repeating Arms Company, New Haven, Conn., for fourteen years, after an earlier training with Randolph, Clowes & Company, Waterbury, Conn., and other New England mills. Mr. Brusstar has therefore had experience in both the production and use of his product. He will also have the advantage of a plant completely and modernly equipped in every detail. It was designed and erected under the supervision of Westinghouse, Church, Kerr & Company.

The sales department of the new mill has been organized completely under the management of B. M. Gardner, secretary and sales manager of the company. The company, in addition to its main office at Cleveland, Ohio, will maintain branch offices in the Dime Bank building, Detroit, Mich.; Ellicott Square building, Buffalo, N. Y.; Railway Exchange building, Chicago, Ill.; and Reibold building, Dayton, Ohio.

## DISSOLUTION

The Rubber Insulated Metals Corporation of New Jersey, with offices at 902 North avenue, Plainfield, N. J., has filed a certificate of dissolution with Secretary of State Martin.

## FIRE

The foundry of the Morency-Van Buren Brass Company, Sturgis, Mich., was totally destroyed by fire on September 12. The loss was about $35,000. The company's building containing the machine shop and tool and plating departments was not damaged. They have started the erection of a new foundry which they expect to have completed by the first of the year.

## INCREASE IN CAPITAL STOCK

The Pioneer Brass Works, Indianapolis, Ind., has increased its capital stock from $10,000 to $70,000. The company operates a brass, bronze and aluminum foundry, brass machine shop and grinding room.

The Hudson Brass Works, 16 Nassau street, Brooklyn, N. Y., has increased its capital from $15,000 to $150,000. The company has a brass foundry, brass machine shop, tool and grinding room, cutting up shop, casting shop, spinning, stamping, brazing, plating, polishing and lacquering departments.

The Macleod Company, Cincinnati, Ohio, has been established for over twenty years. In that time, it has supplied very many of the industries of the United States and foreign countries. The company's activities are chiefly in sand blast equipment and metallurgical furnaces. In order to take care of rapidly expanding business, the Macleod Company has been compelled to enlarge its plant and has increased its capital to $100,000.

## REMOVAL

The Standard Stamping Company, manufacturers of hardware specialties, stamped metal goods, etc., has moved its factory and office from Marysville, Ohio, to Huntington, W. Va., where it will be housed in a new building erected especially for the purpose.

The Star Brass Works, Seattle, Wash., recently moved into its new plant at 1039 Railroad avenue, where the capacity has been increased 50 per cent. This increase in capacity makes it the largest factory dealing exclusively in machine brass products in the Pacific northwest. The Star Works operates a brass machine shop, brazing, soldering and polishing departments.

## INCORPORATIONS

**Business organizations incorporated recently. In addressing them it is advisable to include also the name of the incorporators and their residence. Particulars of additional incorporations may frequently be found in the "Trade News" columns.**

**To conduct a metal manufacturing business**—Metal Shelter Company of New Jersey, East Orange, N. J. Incorporators: Allan K. Pruden, St. Paul, Minn.; Louis Brooks and Isaac Josephson, New York.

**To manufacture brass castings.**—Amalgamated Brass Com-

pany, Cincinnati, Ohio. Capital, $25,000. Incorporator: F. M. Cobb. The company operates a brass foundry, brass machine shop, tool room and casting shop.

**To manufacture plumbing specialties and do job plating, etc.**—F. N. McIntire Brass Works, Boston, Mass. Capital, $25,000. Incorporators: E. L. Chenette, president, and F. N. McIntire, treasurer. They operate a brass foundry, brass machine shop, plating, polishing and lacquering departments.

**To manufacture brass, bronze and aluminum castings, brass, copper and zinc anodes.**—The Connecticut Brass Foundry Company, Waterbury, Conn. Capital, $10,000. Incorporators: F. W. Cohen, S. J. Liftig, H. L. Silver, and B. E. Silver. The company is contemplating making an addition to its anode department.

**To manufacture brass castings, etc.** Colonial Brass Company, Middleboro, Mass. Capital, $150,000. Incorporators: John J. McCarthy, president; Wm. B. Crossley, treasurer, and G. F. Shaw. A brass, bronze and aluminum foundry, brass machine shop, tool and grinding room, casting shop, cutting-up shop, stamping, brazing, soldering, plating, polishing and lacquering departments will be operated by this concern.

**To manufacture metal products.**—The Spencer Specialties Company, Worcester, Mass., has been incorporated with a capital stock of $50,000 by interests connected with the Spencer Wire Company to manufacture metal products for use in musical instruments. The incorporators are: George M. Thompson, president; Frank Kilmer, treasurer, and Harry W. Goddard is a director. The company will operate a tool room, grinding room, cutting-up shop and plating department.

## INQUIRIES AND OPPORTUNITIES

**Under the directory of "Trade Wants" (published each month in the rear advertising pages), will be found a number of inquiries and opportunities which, if followed up, are a means of securing business. Our "Trade Want Directory" fills wants of all kinds, assists in the buying and selling of metals, machinery, foundry and platers' supplies, procures positions and secures capable assistants. See Want Ad. pages.**

## PRINTED MATTER

**Boronic Copper.**—The American Boron Products Company, Reading, Pa., has issued a sixteen-page booklet giving a list and descriptions of the boronic metal alloys which they are now putting upon the market. Copies may be had upon request.

**Metric Reckoner**—Edward Le Bas & Company, 82 Beaver street, New York, has issued a very serviceable folder called "The Combination Metric Ready Reckoner" which contains instructions how to use the various tables given for converting metric measure equivalents into English.

**Brass Foundry Equipment.**—Catalog No. 128, superseding 123, consisting of 8 pages, has been issued by the Whiting Foundry Equipment Company, Harvey, Ill. This catalog gives illustrations and descriptions of the complete line of equipment for the brass foundry and copies of the book will be sent upon request.

**Trading with Latin-America**—Among recent books on the subject of foreign trade there is one issued by the Irving National Bank, of New York, N. Y., entitled "Trading with Latin-America" which constitutes an interesting departure from the customary treatment of that subject. It treats on our always interesting trade relations with Latin-America in a live, business-like way which should appeal strongly to the business man.

**McGill Metal**—The McGill Metal Company, Valparaiso, Ind., has issued a small folder giving chemical analysis and various physical and mechanical properties of McGill metal die castings. This metal is said to be a modified aluminum bronze having a strength equal to that of steel, but enjoying many properties not possessed by steel. The McGill Metal Company is now ready to receive specifications.

**Aluminum**—The British Aluminum Company, Ltd., Toronto, Canada, has issued an attractive post card folder giving a complete list of the publications issued by this company devoted to the various economical applications of aluminum. The folder makes it most convenient for anyone interested in the development of aluminum to obtain just the catalog he will require. The publications run all the way from automobile construction to the rubber trade.

**Plating Supplies.**—The Hanson & Van Winkle Company, Newark, N. J., has issued catalog No. 21, containing 276 pages, including index, which is devoted to a most extensive line of electro-plating and polishing supplies both manufactured and handled by them. If there is anything that the plating and finishing trades need for the production of finished metal goods, they certainly can find descriptions and illustrations of them in this catalog. The list covered by the company includes chemicals, polishing lathes, polishers' and buffers' supplies, grinding machines, dynamos and lacquers.

**Trolley Wire**—The Bridgeport Brass Company, Bridgeport, Conn., has issued a notable pamphlet of thirty-six pages, Bulletin No. 10, which is devoted to Phono electric trolley wire manufactured by this company. The bulletin contains a good deal of information relating to the application of this trolley wire as a conductor of electricity in civic centers. To this end a greater part of the bulletin is taken up by graphic illustrations of the application of this wire in the shape of views of electric transmission lines in various cities and on railroads of the United States and abroad.

**Insulating Brick**—The Armstrong Cork and Insulating Company, Pittsburgh, Pa., has just issued a little folder giving some facts and figures as to the saving in fuel that has been made in various plants by means of Nonpareil insulating brick for boiler settings. These folders are free upon request and further information regarding the use of Nonpareil insulating brick is given in an illustrated booklet entitled "Saving Fuel" which may be had free of charge together with a sample brick.

**Carbon-Free Metals**—The Goldschmidt Thermit Company, New York, has issued the third edition of pamphlet No. 20 which is devoted to carbon-free metals. The pamphlet consists of thirty-two pages and is full of very interesting matter in the shape of photographs of not only the raw material entering into the make-up of these carbon-free metals, but also of the various applications of the finished castings. There is also a considerable amount of descriptions of these thermit metals covering their manufacture and uses. Copies of the pamphlet may be had by corresponding with the Goldschmidt Thermit Company, 120 Broadway, New York.

**Sand Blasting**—A valuable publication treating on the important subject of sand blasting in all of its many phases has just been issued and was distributed at the Boston Exhibition of Foundry Supplies, September 24 to 28, by the United States Silica Company, Chicago, Ill., under the title of "Little Journeys of the Flint Shot Man." This pamphlet, which contains fifty pages, treats of sand blasting in its many phases as done in many shops with flint shot, which is the material produced solely by this company. The work is divided into two parts, the first part is composed of seven chapters and treats of the advantages of sand blasting over other methods of cleaning followed by a description and directions for preparing metal surfaces. While in chapter four the fallacy of the sharp sand is exploded and the advantages of the rounded grains are explicitly set forth. Chapter five treats of descriptions of types of sand-blasting apparatus, while chapters six and seven tell of disposing of waste. Part two contains a number of stories relating to the experience of various foundries and shops in the use of this material. Anyone at all interested in the subject of sand blasting should not fail to get a copy of this remarkable work, which is said to be the first and only publication that completely covers the subject of sand blasting.

## CATALOG EXHIBIT

**An exhibition of every kind of catalog may be seen at The Metal Industry office, 99 John street, New York. The Metal Industry is prepared to do all the work necessary for the making of catalogs, pamphlets, circulars and other printed matter. Estimates will be furnished for writing descriptions, making engravings, printing, binding, for the entire job from beginning to end or any part of it.**

## METAL MARKET REVIEW

WRITTEN FOR THE METAL INDUSTRY BY W. T. PARTRIDGE.

OCTOBER 8, 1917.

COPPER.

In September the copper industry was aroused early in the month by the purchase of 77,000,000 pounds of copper at 25 cents per pound by the Allies for delivery over the remainder of 1917. This led to the belief that negotiations at Washington had resulted in fixing this price for United States Government buying. As time passed, however, without official announcement, uncertainty again prevailed, and business was held in abeyance, prices being merely nominal until the 21st, when through an agreement with the producers of the country the Government price was proclaimed to be 23.50 cents per pound f. o. b. New York, not only for the United States Government but for our Allies and the public as well. Many difficulties immediately developed because of the lack of detail in the announcement; various questions arising as to its applicability to Lake and to casting copper, as well as to electrolytic—questions which will have to be answered before trading is normally resumed. In the meantime, no copper is available for purchase at the controlled price, although a better inquiry from consumers was noted. As the price is generally conceded to be a satisfactory one to the trade, it is expected that production will be developed to the maximum as soon as labor disturbances cease.

Sales made by dealers to consumers, amounting to a few hundred tons, were reported on the 28th, on the basis of 26 cents cash, f. o. b. New York, for October delivery. For prompt electrolytic, outside holders asked 26.50 cents. Casting copper is scarce, and for small quantities dealers asked the same prices as for electrolytic.

TIN.

The tin market in September was quiet and steady, with some dullness noted toward the close of the month, when spot straits was sold at 61½ cents, a net decline of ⅜ cent for the month. Chinese tin at the close was scarce at 56 cents. Banca was held at 59.75 cents. Straits for January shipment was 57.25 to 57.50 cents. Arrivals for the month were 2,405 tons, with 4,500 tons reported afloat. Deliveries into American consumption were 5,402 tons.

LEAD.

Lack of confidence was the predominant feature of the lead market in September, largely due to the unprecedented reduction of 2½ cents per pound to 8 cents New York, by the leading producer, this being the price at which the Government purchases for recent monthly requirements were made. Business was dull throughout the month, and toward the close, independent makers cut under the "Trust" price, lead being sold in New York at 7.95 cents. The decline for the month was from 10.50 to 8 cents per pound, New York basis, and from 10.42½ to 7.92½ cents, St. Louis, for all positions. Lead ore declined $15 per ton from $100 to $85.

SPELTER.

During the early days of September the spelter industry was inert, with few sales and prices largely nominal at 8.05 to 8.17½ cents for prompt, September and fourth quarter positions, respectively, New York basis, and 7.87½ to 8.12½ cents, St. Louis basis. The month closced with a net advance of ⅜ cent per pound, November and December positions ranging ⅛ cent higher than nearby deliveries. In the closing days a contract for 2,000,000 pounds, grade B spelter—99½ per cent. pure zinc—was awarded to the American Metal Company by the United States Government, their bid, 10.67½ cents per pound being the lowest one submitted.

ANTIMONY.

Dullness and declining prices in the antimony trade continued in September until the lowest point, 14.00-14.50 cents for prompt, September and October metal, duty paid, was reached on the 11th. Immediately following, an active market developed, the first in many weeks, with fair sales which carried prices to 15.50 cents duty paid on the 13th for the same positions. After this there were fluctuations within a range of ¾c. per pound. On the last day prices were 15.12½-15.37½c. per pound duty paid for prompt—October. November was ⅛ cent higher to 15.25-15.50c.

ALUMINUM.

The aluminum market was depressed and lifeless during September. Price declines amounted to 6c. per pound for No. 1 virgin 98-99 per cent., from 46-48 cents to 40-42 cents; 6c. for pure 98-99 per cent. remelted, from 44-46 cents to 38-40 cents and 4c. per pound for No. 12 alloy remelted, from 34-36 cents to 30-32 cents per pound.

SILVER.

Silver advanced in September to the highest point since 1881, rising to $1.08½ per ounce on the 21st. Increased supplies and a less active demand combined with speculative operations brought about a sharp reaction in the closing week when prices declined as rapidly as previously they had advanced. On the last day 96⅝ cents was the official figure, this being 11⅞ cents below the highest point, but a net advance for the month of 5⅞ cents per pound.

QUICKSILVER.

Because of large supplies and decreasing demand in September quicksilver declined in price $5 per flask to $110 on the 21st, after which there was no change.

PLATINUM.

Throughout September the demand for platinum continued steady with prices unchanged at $105 for pure and $111 for 10 per cent. iridium.

OLD METALS.

Weakness and declining prices in old metals during the first week in September were followed by renewed activity and higher prices during the next succeeding two weeks, the brasses all being in especially active demand. Aluminum and lead were exceptions, there being almost no demand for them. German silver continued in active demand. Export business was practically confined to brass turnings. After the Government prices for copper and steel were announced business came to a standstill, prices were unsettled with declines reported ranging from ¼ to 4c. per pound all along the 1st, the aluminums being the heaviest sufferers.

## WATERBURY AVERAGE

The average prices of Lake Copper and Brass Mill Spelter per pound as determined monthly at Waterbury, Conn.:

Lake Copper, 1916—Average for year, 28.77. 1917—January, 32.25. February, 35.25. March, 35.50. April, 32.75. May, 32.00. June, 32.50. July, 30.875. August, 39.00. September, 27.25.

Brass Mill Spelter, 1916.—Average for year, 17.725 1917—January, 13.05. February, 13.80. March, 13.45. April, 11.85. May, 11.05. June, 10.85. July, 10.55. August, 10.05. September, 9.80.

## SEPTEMBER MOVEMENTS IN METALS

| | Highest. | Lowest. | Average. |
|---|---|---|---|
| COPPER. | | | |
| Lake | 28.00 | 27.00 | 27.433 |
| Electrolytic | 27.00 | 25.50 | 26.356 |
| Casting | 26.75 | 25.00 | 26.231 |
| TIN | 62.50 | 60.75 | 61.678 |
| LEAD | 10.50 | 8.00 | 9.02 |
| SPELTER | 8.425 | 8.05 | 8.264 |
| ANTIMONY | 15.50 | 14.00 | 14.951 |
| ALUMINUM | 47.00 | 40.00 | 42.605 |
| QUICKSILVER (per flask) | $115,00 | $110.00 | $112.632 |
| SILVER (cts. per oz.) | $1.085 | 90.75 | $1.00739 |

# Metal Prices, October 8, 1917

## NEW METALS.

| | Price per lb. |
|---|---|
| **COPPER—DUTY FREE. PLATE, BAR, INGOT AND OLD COPPER.** Manufactured 5 per centum. | |
| Electrolytic, carload lots, nom.. } Gov't price 23½ | 26 to 26½ |
| Lake, carload lots, nominal.... } Gov't price 23½ | 26 to 26½ |
| Casting, carload lots, nominal | 26 |
| **TIN—Duty Free.** | |
| Straits of Malacca, carload lots | 61.00 |
| **LEAD—Duty Pig, Bars and Old 25%; pipe and sheets.** | |
| 20%. Pig lead, carload lots | 8.00 |
| **SPELTER—Duty 15%.** | |
| Brass Special | 8.75 |
| Prime Western, carload lots, nominal | 8.375 |
| **ALUMINUM—Duty Crude, 2c. per lb. Plates, sheets, bars and rods, 3½ per lb.** | |
| Small lots, f. o. b. factory | 49.00 |
| 100-lb. f. o. b. factory | 45.00 |
| Ton lots, f. o. b. factory | 41.00 |
| **ANTIMONY—Duty 10%.** | |
| Cookson's, Hallet's or American | Nominal |
| Chinese, Japanese, Wah Chang WCC, brand spot | 15.25 |
| **NICKEL—Duty Ingot, 10%. Sheet, strip and wire 20% ad valorem.** | |
| Shot or Ingots | 50c. |
| **ELECTROLYTIC—5 cents per pound extra.** | |
| **MANGANESE METAL** | Nominal |
| **MAGNESIUM METAL—Duty 25% ad valorem (100 lb. lots)** | $2.25 |
| **BISMUTH—Duty free** | $3.00 |
| **CADMIUM—Duty free** | nominal $1.475 |
| **CHROMIUM METAL—Duty free** | .75 |
| **COBALT—97% pure** | $2.70 |
| **QUICKSILVER—Duty, 10% per flask of 75 pounds** | $110.00 |
| **PLATINUM—Duty free, per ounce** | $105.00 |
| **SILVER—Government assay—Duty free, per ounce** | .96⅝ |
| **GOLD—Duty free, per ounce** | $20.67 |

## INGOT METALS.

| | Price per lb. |
|---|---|
| Silicon Copper, 10% according to quantity | 41 to44 |
| Silicon Copper, 20% " " | 55 to60 |
| Silicon Copper, 30% guaranteed. " " | 60 to65 |
| Phosphor Copper, guaranteed 15% " " | 60 to77 |
| Phosphor Copper, guaranteed 10% " " | 54 to61 |
| Manganese Copper, 30%, 2% Iron " " | 69 to75 |
| Phosphor Tin, guaranteed 5% " " | 77 to82 |
| Phosphor Tin, no guarantee " " | 76 to81 |
| Brass Ingot, Yellow " " | 19 to21 |
| Brass Ingot, Red " " | 24 to27 |
| Bronze Ingot " " | 24 to27 |
| Parsons Manganese Bronze Ingots " " | 34 to36 |
| Manganese Bronze Castings " " | 53 to58 |
| Manganese Bronze Ingots " " | 25 to31 |
| Phosphor Bronze " " | 24 to30 |
| Casting Aluminum Alloys " " | 42 to44 |

## OLD METALS.

| Dealers' Buying Prices. | Dealers' Selling Prices. |
|---|---|
| 24.00 to 24.50 Heavy Cut Copper | 26.00 to 27.00 |
| 23.00 to 24.00 Copper Wire | 25.00 to 26.00 |
| 21.00 to 22.00 Light Copper | 23.00 to 24.00 |
| 21.50 to 22.50 Heavy Mach. Comp. | 25.00 to 25.50 |
| 15.50 to 16.00 Heavy Brass | 17.50 to 20.00 |
| 11.50 to 12.00 Light Brass | 13.50 to 14.00 |
| 16.00 to 16.50 No. 1 Yellow Brass Turning | 17.50 to 18.50 |
| 19.00 to 20.00 No. 1 Comp. Turnings | 18.50 to 20.00 |
| 7.00 to 8.50 Heavy Lead | 7.50 to 9.00 |
| 6.00 to 6.25 Zinc Scrap | 6.25 to 6.75 |
| 13.00 to 14.00 Scrap Aluminum Turnings | 14.00 to 15.00 |
| 20.00 to 21.00 Scrap Aluminum, cast alloyed | 22.00 to 24.00 |
| 31.00 to 33.00 Scrap Aluminum, sheet (new) | 33.00 to 34.00 |
| 39.00 to 40.00 No. 1 Pewter | 43.00 to 47.00 |
| 30.00 to 32.00 Old Nickel | 34.00 to 36.00 |
| 23.00 to 25.00 Old Nickel anodes | 26.00 to 27.00 |

## PRICES OF SHEET COPPER.

Mill shipments (hot rolled) ..... 35c. base net
From stock ..... 37c. base net

| SIZE OF SHEETS. Width. | LENGTH. | 64 oz. and over. | 32 oz. to 64 oz. | 24 oz. up to 32 oz. | 16 oz. up to 24 oz. | 15 oz. | 14 oz. | 13 oz. | 12 oz. | 11 oz. |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Extras in Cents per Pound for Sizes and Weights Other than Base. | | | | | | | | |
| Not wider than 30 ins. | Not longer than 72 inches. | Base | Base | Base | Base | ½ | 1 | 1½ | 2 | 2½ |
| | Longer than 72 inches. Not longer than 96 inches. | " | " | " | " | ½ | 1 | 2 | 3 | 4½ |
| | Longer than 96 inches. Not longer than 120 inches. | " | " | ½ | 1 | 2 | 3 | 5 | 7 | |
| | Longer than 120 ins. | " | " | 1 | 1½ | | | | | |
| Wider than 30 ins., but not wider than 36 inches. | Not longer than 72 inches. | " | " | Base | Base | 1 | 2 | 3 | 4 | 6 |
| | Longer than 72 inches. Not longer than 96 inches. | " | " | " | " | 1 | 2 | 4 | 6 | 8 |
| | Longer than 96 inches. Not longer than 120 inches. | " | " | 1 | 2 | 3 | 4 | | | |
| | Longer than 120 inches. | " | 1 | 2 | 3 | | | | | |
| Wider than 36 ins., but not wider than 48 inches. | Not longer than 72 inches. | " | Base | 1 | 2 | 3 | 4 | 6 | 8 | 9 |
| | Longer than 72 inches. Not longer than 96 inches. | " | " | 1 | 3 | 4 | 5 | 7 | 9 | |
| | Longer than 96 inches. Not longer than 120 inches. | " | " | 2 | 4 | 6 | 9 | | | |
| | Longer than 120 inches. | " | 1 | 3 | 6 | | | | | |
| Wider than 48 ins., but not wider than 60 inches. | Not longer than 72 inches. | " | Base | 1 | 3 | 5 | 7 | 9 | 11 | |
| | Longer than 72 inches. Not longer than 96 inches. | " | " | 2 | 4 | 7 | 10 | | | |
| | Longer than 96 inches. Not longer than 120 inches. | " | 1 | 3 | 6 | | | | | |
| | Longer than 120 inches. | 1 | 2 | 4 | 8 | | | | | |
| Wider than 60 ins., but not wider than 72 ins. | Not longer than 96 inches. | Base | 1 | 3 | 8 | | | | | |
| | Longer than 96 inches. Not longer than 120 inches. | " | 2 | 5 | 10 | | | | | |
| | Longer than 120 inches. | 1 | 3 | 8 | | | | | | |
| Wider than 72 ins., but not wider than 108 ins. | Not longer than 96 inches. | 1 | 3 | 6 | | | | | | |
| | Longer than 96 inches. Not longer than 120 inches. | 2 | 4 | 7 | | | | | | |
| | Not longer than 120 inches. | 3 | 5 | 9 | | | | | | |
| Wider than 108 ins., but not wider than 120 ins. | Not longer than 120 inches. | 4 | 6 | | | | | | | |

The longest dimension in any sheet shall be considered as its length.

**CIRCLES, 8 IN. DIAMETER AND LARGER, SEGMENTS AND PATTERN SHEETS,** advance per pound over prices of Sheet Copper required to cut them from ..... 3c.

**CIRCLES LESS THAN 8 IN. DIAMETER,** advance per pound over prices of Sheet Copper required to cut them from ..... 5c.

**COLD OR HARD ROLLED COPPER,** 14 oz. per square foot and heavier, advance per pound over foregoing prices ..... 1c.

**COLD OR HARD ROLLED COPPER,** lighter than 14 oz. per square foot, advance per pound over foregoing prices ..... 2c.

**COLD ROLLED ANNEALED COPPER,** the same price as Cold Rolled Copper.

**ALL POLISHED COPPER,** 20 in. wide and under, advance per square foot over the price of Cold Rolled Copper ..... 1c.

**ALL POLISHED COPPER,** over 20 in. wide, advance per square foot over the price of Cold Rolled Copper ..... 2c.

For Polishing both sides, double the above price.

The Polishing extra for Circles and Segments to be charged on the full size of the sheet from which they are cut.

**COLD ROLLED COPPER,** prepared suitable for polishing, same prices and extras as Polished Copper.

**ALL PLANISHED COPPER,** advance per square foot over the prices for Polished Copper ..... 1c.

# Metal Prices, October 8, 1917

## PRICES ON BRASS MATERIAL—MILL SHIPMENTS.

In effect September 1, 1917.

To customers who buy over 5,000 lbs. per year.

| | Net base per lb. High Brass. | Low Brass. | Bronze. |
|---|---|---|---|
| Sheet | $0.34¼ | $0.37 | $0.39¾ |
| Wire | .34¼ | .37 | .39¾ |
| Rod | .32½ | .37¾ | .40¾ |
| Brazed tubing | .41½ | — | .47¼ |
| Open seam tubing | .41½ | — | .47¼ |
| Angles and channels | .41½ | — | .47¼ |

To customers who buy over 5,000 lbs. per year.

| | Net base per lb. High Brass. | Low Brass. | Bronze. |
|---|---|---|---|
| Sheet | $0.36¼ | $0.39 | $0.41¾ |
| Wire | .36¼ | .39 | .41¾ |
| Rod | .34¼ | .39¾ | .42¾ |
| Brazed tubing | .43½ | — | .49¼ |
| Open seam tubing | .43½ | — | .49¼ |
| Angles and channels | .43½ | — | .49¼ |

[Note.—Net extras for quality for both sections of above metal prices are not quoted due to the fluctuations in the price of zinc.—Ed.]

## BARE COPPER WIRE—CARLOAD LOTS.

30c. per lb. base.

## SOLDERING COPPERS.

300 lbs. and over in one order.....41c. per lb. base
100 lbs. to 300 lbs. in one order.....42c. " " "
Less than 100 lbs. in one order.....43½c. " " "

## PRICES FOR SEAMLESS BRASS AND COPPER TUBING.

**From 1⅛ to 8½ O. D. Nos. 4 to 18 Stubs' Gauge, — per lb.**
**Seamless Copper Tubing, — per lb.**
For other sizes see Manufacturers' List.
**Due to fluctuations of the metal market we are unable to quote these prices.**

## PRICES FOR SEAMLESS BRASS TUBING Iron Pipe Sizes.

Iron pipe sizes with price per pound.

⅛ ¼ ⅜ ½ ¾ 1 1¼ 1½ 2 2½ 3 3½ 4 4½ 5

**Due to fluctuations of the metal market we are unable to quote these prices.**

## PRICE LIST OF IRON LINED TUBING—NOT POLISHED.

**Due to fluctuations of the metal market we are unable to quote these prices.**

## PRICES FOR TOBIN BRONZE AND MUNTZ METAL.

Tobin Bronze Rod.....37½c. net base
Muntz or Yellow Metal Sheathing (14" x 48").....34c. " "
Muntz or Yellow Metal Rectangular sheets other than sheathing.37c. " "
Muntz or Yellow Metal Rod.....34c. " "

Above are for 100 lbs. or more in one order.

## PLATERS' METALS.

Platers' bar in the rough, 65c. net.
German silver platers' bars dependent on the percentage of nickel, quantity and general character of the order.
Platers' metal, so called, is very thin metal not made by the larger mills and for which prices are quoted on application to the manufacturer.

## PRICES OF NICKEL ANODES.

85 to 87% purity ..... 50c. per lb.
90 to 92% " ..... 52½c. " "
95 to 97% " ..... 55c. " "

## PRICE SHEET FOR SHEET ALUMINUM—B. & S. Gauge.

Base price, 60c.

We are unable to quote these prices, but they can be had upon application to manufacturers and dealers.

## PRICE LIST SEAMLESS ALUMINUM TUBING.

We are unable to quote these prices, but they can be had on application to manufacturers and dealers.

## PRICE LIST FOR ALUMINUM ROD AND WIRE.

We are unable to quote these prices.

## PRICES OF SHEET ZINC.

Duty, sheet, 15%. Cents per lb.
Carload lots, standard sizes and gauges, at mill.....19 cent basis, less 8%
Casks, jobbers' prices..... 20c.
Open casks, jobbers' prices ..... 20.5c.

## BASE PRICE GRADE "B" GERMAN SILVER SHEET METAL.

| Quality. | Net per lb. | Quality. | Net per lb. |
|---|---|---|---|
| 5% | 45½c. | 16% | 50c. |
| 8% | 46½c. | 18% | 50½c. |
| 10% | 46¾c. | 20% | 52¼c. |
| 12% | 48½c. | 25% | 60c. |
| 15% | 49c. | 30% | 65½c. |

## GERMAN SILVER WIRE.

| Quality. | Net per lb. | Quality. | Net per lb. |
|---|---|---|---|
| 5% | 47c. | 15% | 55c. |
| 8% | 49c. | 16% | 55½c. |
| 10% | 51c. | 18% | 57½c. |
| 12% | 53c. | 30% | 73c. |

**The above Base Prices are subject to additions for extras as per list printed in Brass Manufacturers' Price List and from such extras 50% discount will be allowed. The above base prices and discounts are named only to wholesale buyers who purchase in good quantities. Prices on small lots are considerably higher.**

## PRICES FOR SHEET BLOCK TIN AND BRITANNIA METAL.

Sheet Block Tin—18" wide or less. No. 26 B. & S. Gauge or thicker. 100 lbs. or more 5c. over Pig Tin. 50 to 100 lbs. 6c. over, 25 to 50 lbs. 8c. over, less than 25 lbs. 10c. over.
No. 1 Britannia—18" wide or less. No. 26 B. & S. Gauge or thicker, 100 lbs. or more 3c. over Pig Tin. 50 to 100 lbs. 4c. over, 25 to 50 lbs. 5c. over, less than 25 lbs. 10c. over.
Above prices f. o. b. mill.
Prices on wider or thinner metal on request.

## PRICES OF SHEET SILVER.

Rolled sterling silver .925 fine is sold according to gauge quantity and market conditions. No fixed quotations can be given, as prices range from — below to — above the price of bullion.
Rolled silver anodes .999 fine are quoted at ——— above the price of bullion. Manufacturers state that as silver is selling at a premium at the present time they are unable to give any quotation.

## PRICES OF SOME METAL INDUSTRY CHEMICALS AND MATERIALS.

| | |
|---|---|
| Phosphorus—Duty free, according to quality | Nominal. |
| Nickel Salts, Single bbl | 14c. per lb. |
| Nickel Salts, Double bbl | 11c. " " |
| Sodium Cyanide | 37c. " " |
| Silver Nitrate, 100 oz. lots | 70c. per oz. |
| Sodium Carbonate (Sal Soda) | .05c. per lb. |

**Prices for Cotton Buffs.**

Open buffs per 100 sections (nominal).

| | | | | | |
|---|---|---|---|---|---|
| 12 inch, | 20 ply, | 64/68, | cloth | base | $40.00 |
| 14 " | 20 " | 64/68, | " | " | 52.50 |
| 12 " | 20 " | 84/92, | " | " | 47.55 |
| 14 " | 20 " | 84/92, | " | " | 61.70 |

Sewed buffs per pound.
Bleached and unbleached ..... base 34c.
Colored ..... " 31c.